ember 1946

Chemical Industries

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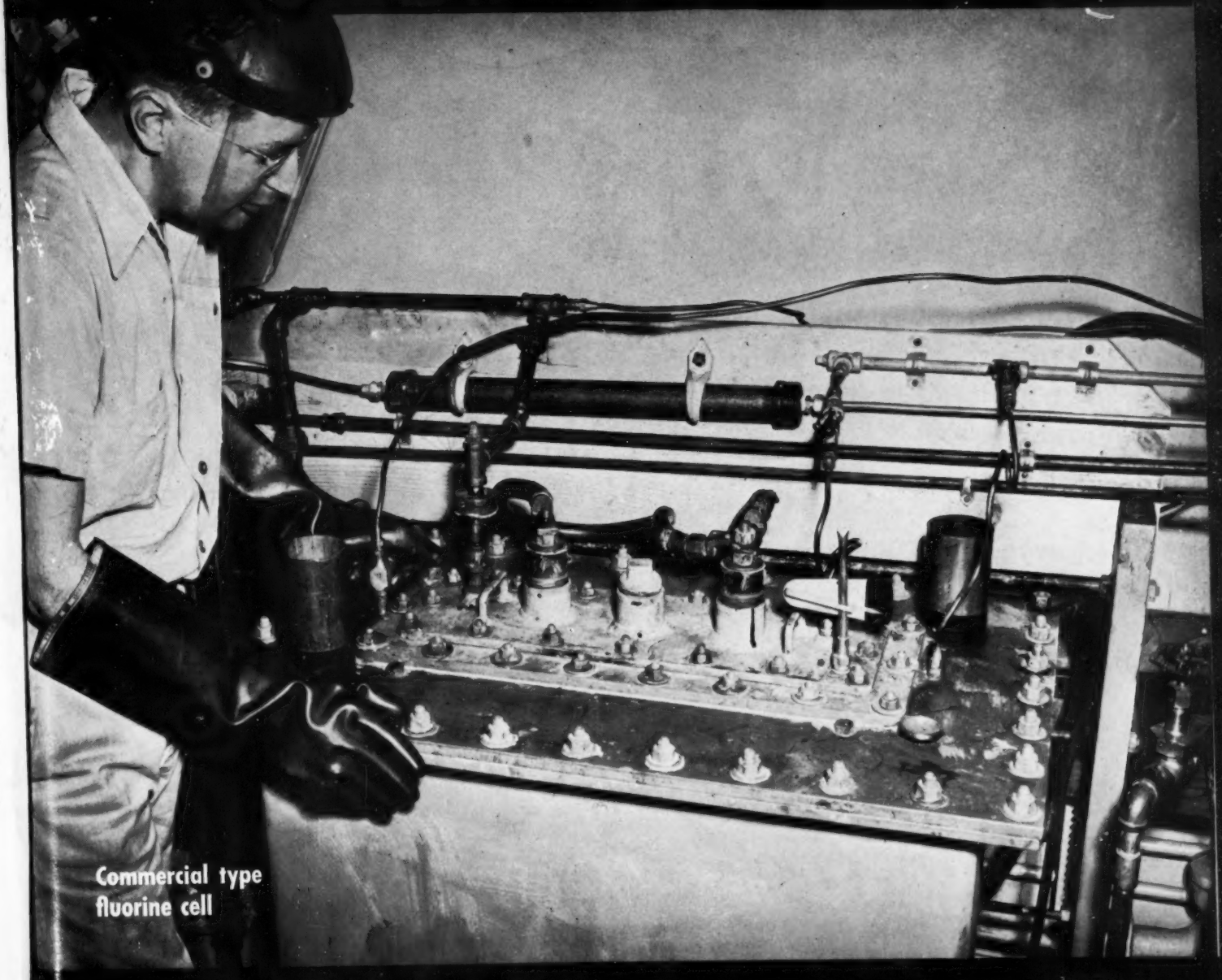

Commercial type fluorine cell

FLUORINE CHEMISTRY opens some industrial doors p. 1006

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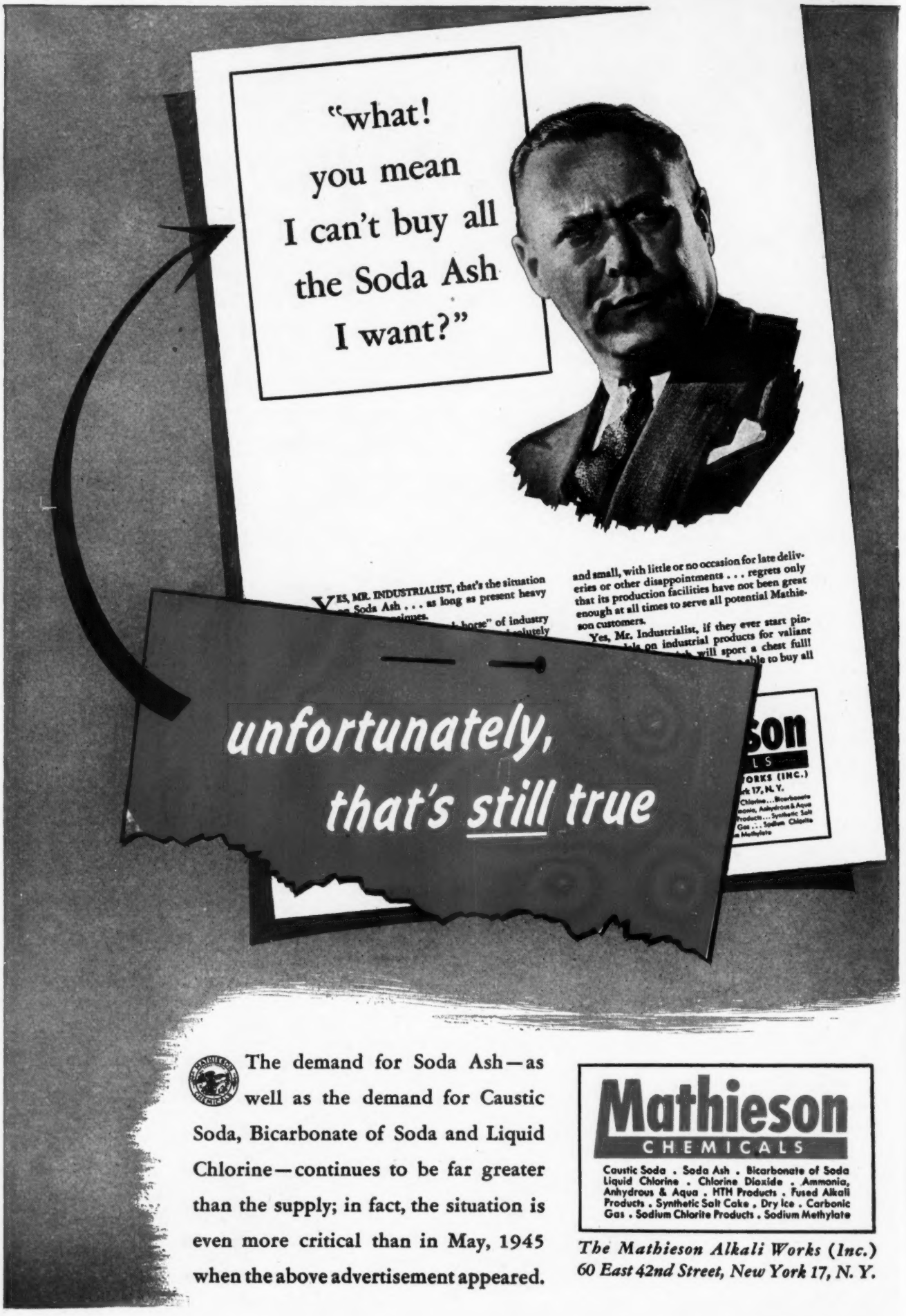

The demand for Soda Ash—as well as the demand for Caustic Soda, Bicarbonate of Soda and Liquid Chlorine—continues to be far greater than the supply; in fact, the situation is even more critical than in May, 1945 when the above advertisement appeared.

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THE CHEMICAL BUSINESS MAGAZINE

VOLUME 59
NUMBER 6

Chemical Industries

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COVER: This laboratory fluorine cell, constructed from carefully tested materials and designs at the Whitemarsh Research Laboratories of the Pennsylvania Salt Manufacturing Company, embodies most of the features necessary for a full scale commercial production cell.

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THE READER WRITES

The Art of Profiting from Unexpected Occurrences

In a recent address before the Industrial Research Institute honoring Dr. Willis R. Whitney, director of the General Electric Research Laboratory, Dr. Irving Langmuir used the word "serendipity," which he defined as "the art of profiting from unexpected occurrences." This old and wonderful descriptive word should be better known by members of the chemical industries. Most of us can recount numerous personal experiences where it could certainly have been applied. It is for this reason that we present the following letter from Dr. Langmuir detailing some of his researches into the interesting origin and history of the word.—EDITOR.

To the Editor of Chemical Industries:

In reply to your letter I send you the following extracts from my notes regarding the history of the word "serendipity."

The Oxford Dictionary gives as a definition, "the faculty of making happy and unexpected discoveries by accident".

In the Boston Public Library I was able to get a two volume book of letters of Horace Walpole to Sir Horace Mann. In the letter dated 28 January 1754, I find that Walpole discusses his discovery of the meaning of a fleur-de-lis at the top of a coat of arms which had puzzled him. He then says, "This discovery, indeed, is almost of that kind which I call Serendipity, a very expressive word, which as I have nothing better to tell you I shall endeavor to explain to you: you will understand it better by the derivation than by the definition. I once read a silly fairy tale called "The Three Princes of Serendip"; as their Highnesses travelled, they were always making discoveries, by accidents and sagacity, of things which they were in quest of; for instance, one of them discovered that a mule blind of the right eye had travelled the same road lately because the grass was eaten only on the left side, where it was worse than on the right. Now do you understand Serendipity? One of the most remarkable instances of this accidental *sagacity* (for you must observe that *no* discovery of a thing you *are* looking for comes under this description) was of my Lord Shaftsbury, who, happening to dine at Lord Chancellor Clarendon's, found out about the marriage of the Duke of York and Mrs. Hyde by the respect with which her mother treated her at the table."

IRVING LANGMUIR, Associate Director
Research Laboratory
General Electric Company
Schenectady, N. Y.

Adhesives No Longer A Stepchild Industry

To the Editor of Chemical Industries:

May I commend you on the excellence of Dr. Alexander Frieden's article on starch adhesives, which appeared in the October issue of CHEMICAL INDUSTRIES.

He has treated this subject in a way that is very helpful and clearly out of long experience with the adhesive field.

His statement that the adhesive industry has now reached its proper stature is encouraging. The writer happens to be Chairman of the Board of the Adhesive Manufacturers Association of America and has constantly endeavored to raise the standards of the adhesive industry. I think it is a very important industry and one which should so be recognized by all concerned.

D. V. WILLIAMSON, President
Williamson Adhesives, Inc.
Chicago 8, Ill.

Suggests More Subjects For Market Series

To the Editor of Chemical Industries:

I was interested in seeing the latest article on Marketing Research in which you indicated that there would be several more forthcoming in this series.

Upon reading the articles to come I did not see any on the following statistics which of course are of much importance in connection with commercial development.

1. Transportation, public and private.
2. Communication.
   As you know both of these are quite important in connection with marketing research.
3. Statistical sources on foreign trade. While some of that was covered in the discussion of the Department of Commerce, I believe that a special article on it is warranted, which will include statistics issued by other countries and the League of Nations; shipping statistics and statistics on plans of payment.

I feel that at least one more article should be included in the series, perhaps under the title of "Miscellaneous Sources".

ROBERT S. ARIES
Consulting Engineer
Brooklyn 2, N. Y.

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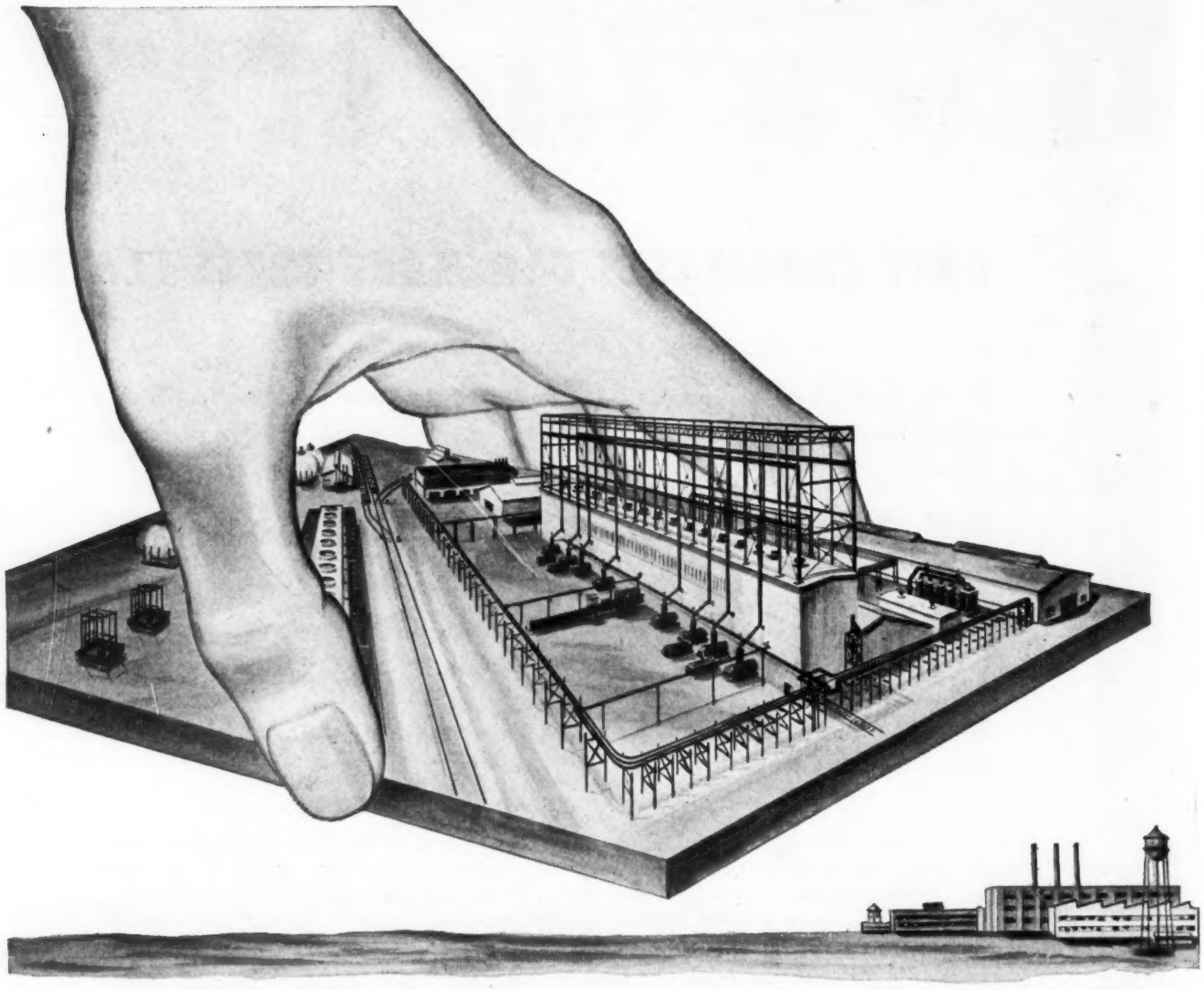

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T. N. SANDIFER *reporting*

New Congress . . . ICC Rail Rate Increases . . . Civilian Technicians for the Navy . . . German Scientists . . . Foreign Priorities on Nitrogen . . . Pipe-Line Disposal

New Congress—Legislation, Committees and Investigations

UNDER CLOSE FOCUS, there are some industry sidelights worth noting about the incoming 80th (Republican) Congress.

First, as a generalization, the more sweeping of patent legislation, which held some interest for various segments of the chemical field, probably is destined for much further study, if it comes up at all, in the welter of other legislation now shaping. It will be recalled that a number of such bills were left before committees, particularly those involving drastic revision of the anti-trust laws.

The change in some committee chairmanships likewise alters the outlook for certain other pending legislation bearing on chemical producers. The so-called National Fertilizer Policy bill, left before the Senate Agriculture Committee at the last session, is in this category. In the House, this committee (Agriculture) will be headed by Representative Clifford Hope, veteran Kansas member, and in the Senate, may be headed by Senator Capper, but this is not certain yet. In any case, bills of this nature, involving as they do, some fundamental changes in production and distribution, are not likely to get early attention.

There probably will be a flurry of "investigations." One is expected to be a full-fledged examination of the disposal of the Government's pipe lines, about which much has been said here.

All the Government's present emergency and old-line regulatory machinery is likely to be in for scrutiny, and perhaps some modification as to policy.

WAA Rejects All Bids on Big & Little Inch Lines

A RECENT CHANGE OF POLICY, resulting from relaxed Army-Navy attitude toward the sale of two Texas to New York oil pipe lines, brought on a cancellation of all bids received thus far. Previously the armed services had been opposed to the use of the lines for any use other than for transporting oil, primarily on the basis of national security. Now the Army-Navy Petroleum Board feels that the sale for use in handling natural gas will not involve too great a reconversion problem in case of another emergency.

The new policy permits any limitations as to the use of the pipe lines by a purchaser to be determined in consultation with the board. The prior policy required Congressional approval of any sale for natural gas use.

A second factor bearing on the rejection of previous bids was the feeling that none of them guaranteed the Government what is considers a fair price. The two lines which cost $147,756,600 to build are currently appraised at $113,700,000.

One Texas syndicate is reported to have more than $100,000,000 ready to put up for the purchase for transporting natural gas from Texas to New York and Philadelphia, and to be prepared to spend $20,000,000 at once to install booster stations along the line. A group of New Yorkers is also understood to be interested in acquiring the lines for natural gas.

The new policy which makes it easier for natural gas interests to enter the picture promises to stir up some controversy from other competing fuel and transportation groups — coal producers, railroads and operators of oil tankers.

German and Austrian Scientists Being Brought to U. S.

A PROJECTED MOVEMENT to this country of selected scientific and technical experts from Germany and Austria has become shrouded in official secrecy.

The plan is part of a joint State-War-Navy program for utilizing the scientific knowledge and skills of former enemy specialists, to further American military research. It first became known in September, and was scheduled for the ensuing several months. The scientists and others moved to this country would be strictly volunteers, and would be in addition to perhaps 200 such highly-trained foreigners brought here since the end of the war in Europe.

Of special interest is the statement from the War Department that upon completion of the work for which the Government brought them to the United States, these experts would be released for availability to private American industry. Outstanding developments from work of the group first brought here, it is understood, already are being offered to American firms.

Fields represented by this foreign group include electronics, supersonics, guided missiles, jet propulsion, fuels, lubricants, synthetics, and varied fields of applied physics and chemistry.

Presumably the secrecy was invoked after it was learned that Russia was likewise seeking to utilize former enemy brains, but evidently not on an entirely voluntary basis, as was the case with the experts brought to the United States. There is nothing official on this point, but efforts by this writer recently to elicit further information were politely blocked.

Navy to Hire Civilian Technicians

THE NAVY HAS BEEN AUTHORIZED to recruit its own civilian scientific and technical personnel. A new board of civilian naval examiners has been established, to facilitate this procedure. Incidentally, the same authorization will be extended to other Federal departments, it is learned from Civil Service Commission.

The latest issue of "Scientific Personnel Bulletin" by the Navy Department's Scientific Personnel Branch in the Office of Naval Research lists openings for chemists, chemical engineers, petroleum engineers, physicists, plastics technologists, textile technologists, besides positions in electronics, radar, rubber, and as management analysts, mathematicians, statistics, and various related fields.

A typical opening for "chemist" lists as qualifications; "A bachelor's degree in chemistry or chemical engineering plus about ten years progressive experience in chemistry. Specific experience in explosives would be highly desirable although a thorough background in chemistry should provide satisfactory experience. A graduate degree in chemistry or chemical engineering would also be desirable."

The position is that of chief of a subdivision of approximately 25 technical persons of designated ratings. Generally, says the Bulletin, the work consists of supervision of design, development, production engineering and instrumentation

in chemistry and explosives as applied to ammunition. The work is concerned primarily with pyrotechnics, initiators, analysis and other special problems. Studies of color, candlepower, density and volume of smoke are undertaken.

The Navy's Ordnance Laboratory, presently located in the Washington, D. C., Navy Yard, is soon to be moved to a new $16,000,000 plant in nearby Maryland.

Synthetic Liquid Fuel Plant Now Operating

DEPARTMENT OF AGRICULTURE SCIENTISTS have started operations at their new plant at Peoria, Ill., for production of synthetic liquid motor fuels from farm residues.

The plant is designed to handle enough residues to provide feramentable material for manufacture of 500 gallons of alcohol per day. It is the Department of Agriculture's part of the general research program authorized by Congress in 1944, for production of liquid motor fuels from non-petroleum sources. Other plants, operated by the Bureau of Mines, will test production from oil-bearing shales, coal, gas, etc.

Rate Increase Decision May Come Soon

THE INTERSTATE COMMERCE COMMISSION may issue a formal decision before the year's end on the railroads' pending plea for a general 25 per cent increase in rates, thus permitting any increase approved to take effect on short notice, according to some sources here.

Meanwhile varied chemical industry groups have vigorously opposed not only the 25 per cent rate increase but also the interim increases approved by I. C. C.

The National Fertilizer Association, Inc., has just filed a new brief opposing proposed increased rates on fertilizer, fertilizer materials and phosphate rock, which are before the I. C. C.

The fertilizer industry is opposed to the proposed increases in freight rates, spokesmen informed the Commission, primarily because of the cumulative freight costs that result from the inbound and outbound movements of fertilizer and fertilizer materials practically double freight revenues.

"Total rail revenue on fertilizers and fertilizer materials has more than doubled since 1929," said the brief just filed, "revenue from phosphate rock, sulphur, mixed fertilizers and fertilizer materials has increased from approximately $51,000,000, in 1929, to over $110,814,000 in 1945.

"Similar increases have taken place as to all fertilizer materials. Total revenue in 1945 on these commodities was over 500 per cent of the revenue in 1932. . . ."

A factor in the situation has been the switch to rail movement from water transportation. To now increase the rates on rail shipments, the Commission was warned, "will undoubtedly again force the traffic to move by water and actually defeat the purpose of this proceeding".

Concern is also expressed by the industry in its arguments before the Commission, that the increased rates, if ordered, will result in arbitrarily increasing the price of fertilizer to the farmer. A reduction in use of fertilizer appears to be the inevitable consequence.

The Tennessee Valley Authority also has entered a protest, based on its interest in rates applicable to the phosphate rock. Taking no position as to whether a general freight rate increase should be authorized by the I. C. C., the Authority advised the Commission however, that "we do believe that a percentage increase in rates on phosphate rock would aggravate an unjustifiable existing rate disparity favoring short-haul as opposed to long-haul traffic, which grew up originally on account of historical factors that no longer exist."

The TVA, suggesting that any increase is authorized in rates on phosphate rock take the form of a flat per ton increase, rather than a percentage increase, proposed specifically an increase of 1 per cent per ton on phosphate rock for each 1 per cent increase that may be granted in freight rates generally.

The Authority, incidentally emphasized that it is one of the country's largest single users of phosphate rock for the manufacture of elemental phosphorous for military uses, and for production of phosphate fertilizers.

Also among protesting interests are Reynolds Metals Company, which points out that "a special situation exists which would make the application of full percentage increases proposed by the railroads on aluminum and raw materials, ruinous to the industry." The company suggested that these shipments might properly be exempt from any increase.

A number of other concerns are opposing the 25 per cent increase, one of which deserves particular mention because of its participation in salt cake production used predominantly by paper mills of the South and Southwest in production of Kraft paper.

American Potash and Chemical Corporation has filed a brief with I. C. C., regarding the effect of proposed increases on both potash and salt cake. The company, among other observations, recalled that the salt cake by-product of German potash mines could again become the source of foreign competition which it was before the war.

While it is impossible to speculate on an I. C. C. decision with any accuracy, close observers of Commission activities are inclined to think the Commission will not approve the full 25 per cent rate increase in any event. More likely is a compromise on a smaller increase, which will include the interim rates already allowed on some commodities.

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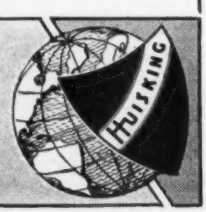

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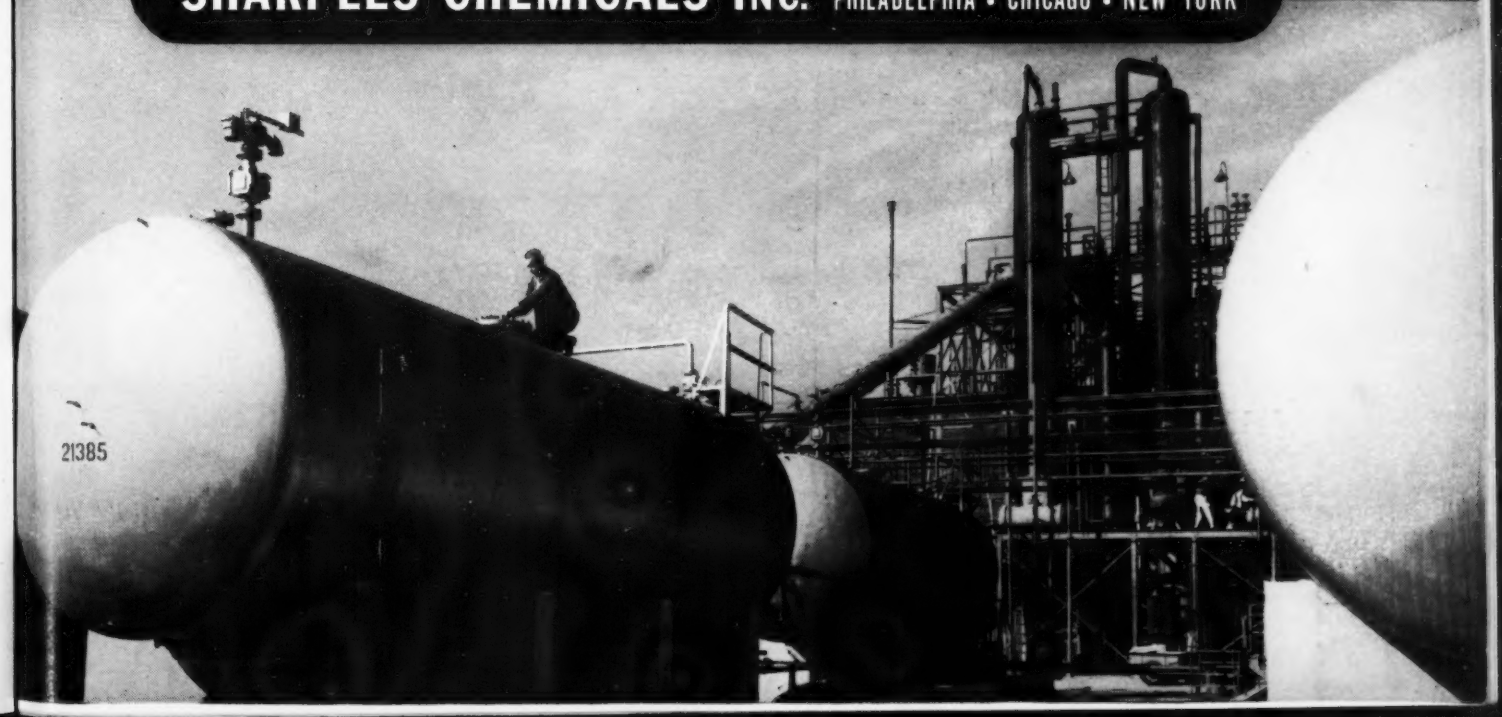

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SULFRAMIN

A SYNTHETIC ORGANIC DETERGENT THAT IS EFFECTIVE EVEN IN DILUTIONS OF 1 to 10,000

Of special interest to manufacturers of dyeing assistants, tanning specialties, laundry detergents, and general cleaners.

SULFRAMIN DT and SULFRAMIN LW (Powder) Powerful synthetic detergents and foaming agents unsurpassed wherever hard water presents a problem. LW has a higher lauric content, and consequently is preferred when used in water colder than 50° C. Textile processors, manufacturers of dyeing assistants, tanning specialties, bath preparations and laundry detergents use either type, depending upon the temperature of the solution. LW is recommended for automotive cleansers since cold water is commonly used for car washing.

SULFRAMIN DH (Paste) A concentrated, slightly alkaline detergent offering great money value as an all around boil off compound. It is adaptable to the manufacture of various scouring, cleansing and dyeing assistants; and is usable under any water conditions.

SULFRAMIN DT (Paste) A strictly neutral, synthetic detergent, with good wetting qualities and high resistance to hard water. Manufacturers of dyeing assistants, and textile processors, use it principally in scouring and dyeing preparations compounded to function wherever alkaline solutions are to be avoided.

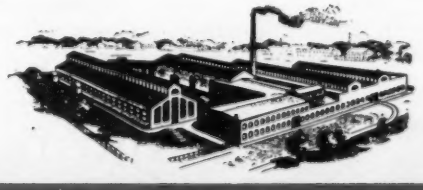
SULFRAMIN DR A neutral compound of high wetting and scouring qualities, having the appearance of a clear, sulphonated oil. It is immediately soluble in hot or cold water, and is therefore an ideal dyeing assistant. It can be employed advantageously as a straight product or in conjunction with various sulphonated oils. It lends itself ideally to the compounding of shampoos, liquid soap, and liquid cleansers.

SULFRAMIN P A powerful built-up detergent which is invaluable in the preparation of household detergents and cleaners. It is particularly efficient in washing machines, packaged laundry detergents, and general cleaners.

SULFRAMIN DHL A clear, leveling agent having the appearance of a sulphonated oil; and suitable for solving your most vexing dyeing problems. It has powerful leveling and penetrating qualities, and assures complete satisfaction in the processing of rayon and acetate fabrics. DHL also lends itself ideally to compounding; and is used extensively in the tanning industries for wetting-back applications.

SULFRAMIN N This is a non-foaming wetting agent, having the appearance of a heavy paste. Although of radically different chemical structure, Sulframin N shares many of the advantages inherent in many of the other Sulframin products. Its strongest feature is its complete immunity to the effects of inorganic acids and alkalies. Consequently, it is preferred in the processing of wool, such as in carbonizing, in dyeing, etc. Not only is Sulframin N an outstanding leveling agent; it can also be safely employed with any amount of alkali.

ULTRAPONE A liquid emulsifying agent, especially useful in water-in-oil emulsions, that is readily dispersible in water, and soluble in all organic compounds; such as hydrocarbons, alcohols, esters, etc. Formulated to lend greater cleaning power to naphtha solutions, Ultrapone is particularly valuable when used in dry-cleansing detergents; adhesive emulsions; and in the manufacture of many cosmetics.



ULTRA CHEMICAL WORKS, Inc.

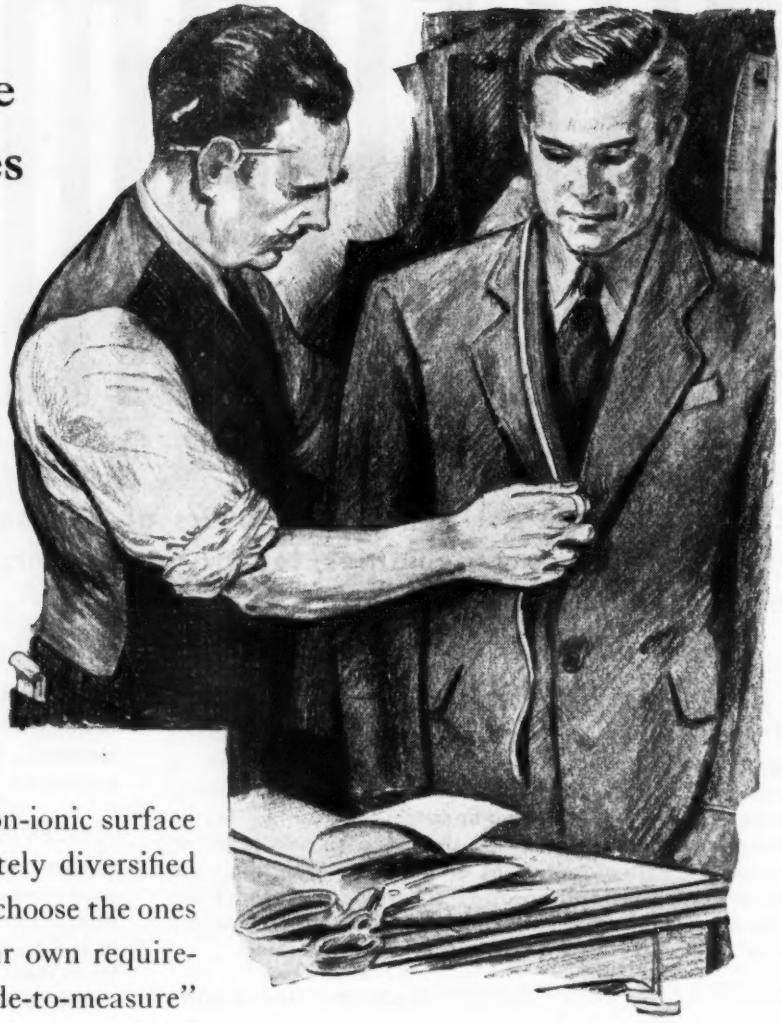
• PATERSON, N. J. • *IN CANADA . . . Delta Chemical Company, Brantford, Ontario*

• CHICAGO, ILL. • *IN MEXICO . . . Icon, S. A., Mexico, D. F.*

They Fit the Job Like Custom-Made Clothes

ATLAS NON-IONIC EMULSIFIERS

Give You Exactly the Surface Active Agent You Want When You Want It



Spans, Tweens and other Atlas non-ionic surface active agents offer you a completely diversified list of properties, enabling you to choose the ones you need and adapt them to your own requirements. They fit your job like "made-to-measure" clothes.

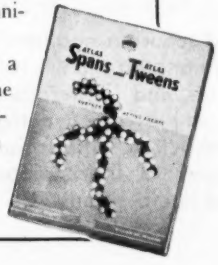
Atlas surface active agents range from complete oil solubility to complete water solubility, including all stages in between. They are compatible with each other and many other industrial chemicals. They produce emulsions which are stable to freezing and electrolytes.

For more details about Atlas surface active agents, send for the booklet shown at the right. If you have special problems not discussed in this booklet, feel free to call on Atlas technicians.

ATLAS SPANS AND TWEENS

Atlas Spans constitute a series of technical long chain fatty acid partial esters of hexitol anhydrides. The hexitol anhydrides include sorbitans and sorbides, mannitans and mannides.

Atlas Tweens comprise a series of polyoxyalkylene derivatives of hexitol anhydride partial long chain fatty acid esters.



Span and Tween: Reg. U. S. Pat. Off.

ATLAS INDUSTRIAL CHEMICALS DEPARTMENT

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

FOR YOUR SOLVENT...
USE A

KETONE

Shell Chemical Ketones possess a sufficient variety of characteristics to meet almost any solvent requirement of the surface coating industry. Likewise they offer a wide range of selection for other process industries.

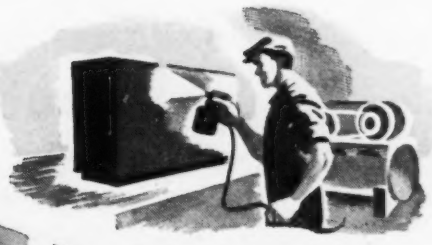
METHYL ETHYL KETONE — a low-boiling, fast-evaporating, rapid-cutting solvent, which does not hydrolyze.

METHYL ISOBUTYL KETONE — characterized by good blush resistance and solvent power, medium boiling point, no hydrolytic reaction during storage.

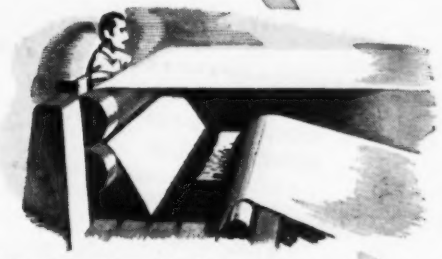
MESITYL OXIDE—higher solvent power than saturated Ketones of similar molecular weight because of double bond between two carbon atoms.

ACETONE — of all Ketones, highest dilution ratio with toluene . . . most rapid evaporating . . . lowest viscosity with nitrocellulose solutions at given concentration.

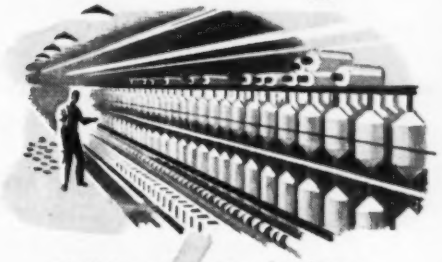
DIACETONE ALCOHOL — an active, high-boiling solvent. Improves blush resistance and flow-out. Miscible in all proportions with water . . . most organic solvents.



With Nitrocellulose Lacquers. Active solvent portion of lacquers can be completely formulated with Shell Chemical Ketones. Lacquers have proper evaporation rate, good blush resistance, high solids, low viscosity.

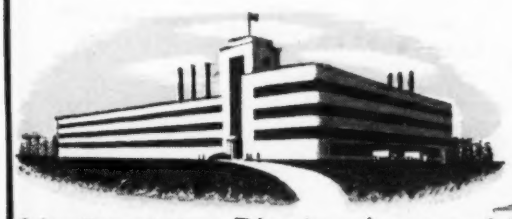


Vinyl Resins. Acetone, MEK, MIBK and Mesityl Oxide have excellent solvent power for vinyl type resins . . . produce high-solids solutions which do not gel.



Cellulose Acetate. Acetone aids in preparation of spinning solutions for rayon. Diacetone contributes blush resistance to lacquers and thinners.

Syntheses. MEK undergoes chlorination, oxidation, and condensation with aliphatic and aromatic compounds. Acetone can be used as a raw material, either as medium of reaction or reacting substance.



Other Formulations. Diacetone is successfully used in hydraulic brake fluids . . . Acetone and MEK as wax precipitants . . . MEK in making cements based on vinyl resins and acrylonitrile types of synthetic rubber.

SHELL CHEMICAL CORPORATION

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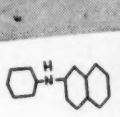
Los Angeles • Houston • St. Louis • Chicago • Cleveland

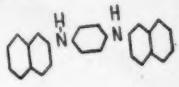
B. F. Goodrich Chemical Company

has available for sale these organic chemicals



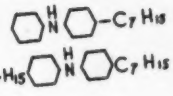
Phenyl B Naphthyl Amine

Distilled—Available in commercial quantities
M. P. 107°
Purity 99.5%
Commercial—Available in commercial quantities
M. P. 106°
Purity 98.0%



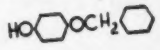
Di B Naphthyl p Phenylene Diamine

Available in commercial quantities
M. P. 230° C
Purity 98%



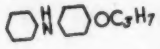
Mixed Mono-and Diheptyl Diphenyl Amines

Available in commercial quantities
Distillation range—145-245 (3.0 mm)
Purity 98%



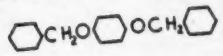
Monobenzyl Ether of Hydroquinone

Available in commercial quantities
M. P. 113°
Purity 90%



Isopropoxy Diphenyl Amine

Available in commercial quantities
M. P. 78°
Purity 92% min.

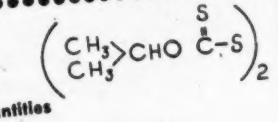


Dibenzyl Ether of Hydroquinone

Available in Pilot Plant quantities
M. P. 119°
Purity 85%

p Hydroxy Diphenyl Amine

Available in commercial quantities
M. P. 150
Purity 92%

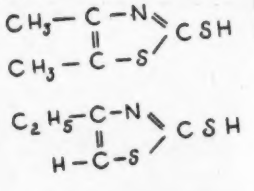


Di Isopropyl Dixanthogen

Available in commercial quantities
M. P. 52°
Purity 98%

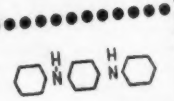
N-Nitroso Diphenyl Amine

Available in commercial quantities
M. P. 62°
Purity 97%



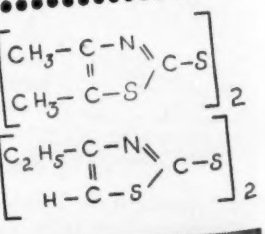
Mixed Ethyl and Dimethyl Mercaptothiazoles

Available in commercial quantities
M. P. 136-153°
Purity Approximately 85% dimethyl and 15% ethyl mercaptothiazoles



Diphenyl p Phenylene Diamine

Available in commercial quantities
M. P. 144°
Purity 92%



Mixed Aliphatic Thiazyl Disulfides

Available in commercial quantities
Liquid

For additional information please write B. F. Goodrich Chemical Company, Department CD-12, Rose Building, Cleveland 15, Ohio

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

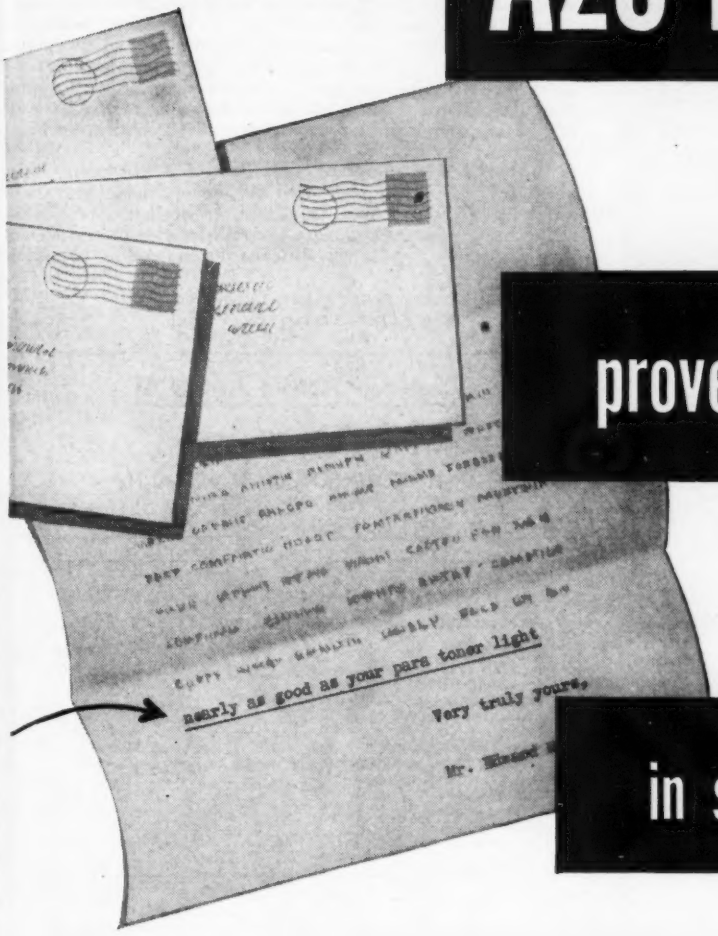
WORLD'S LARGEST PRODUCER OF SYNTHETIC RESINS

RCI

Quota Free!

No. 5900

AZO RED TONER



proves its worth...

in scores of formulations

They're pouring in—letters and comments from the trade on RCI's new organic red pigment. And all confirm our laboratory findings, that Azo Red Toner is practically the equal of our famous 5055 Para Toner Light in masstone, light fastness, tinting strength, hiding power, wetting and grinding. That's great news for you because No. 5900 Azo Red Toner is available *right now* in any desirable quantities. Write direct to the Sales Department in Detroit for testing samples and further data.

REICHHOLD CHEMICALS, INC.

General Offices and Main Plant, Detroit 20, Michigan

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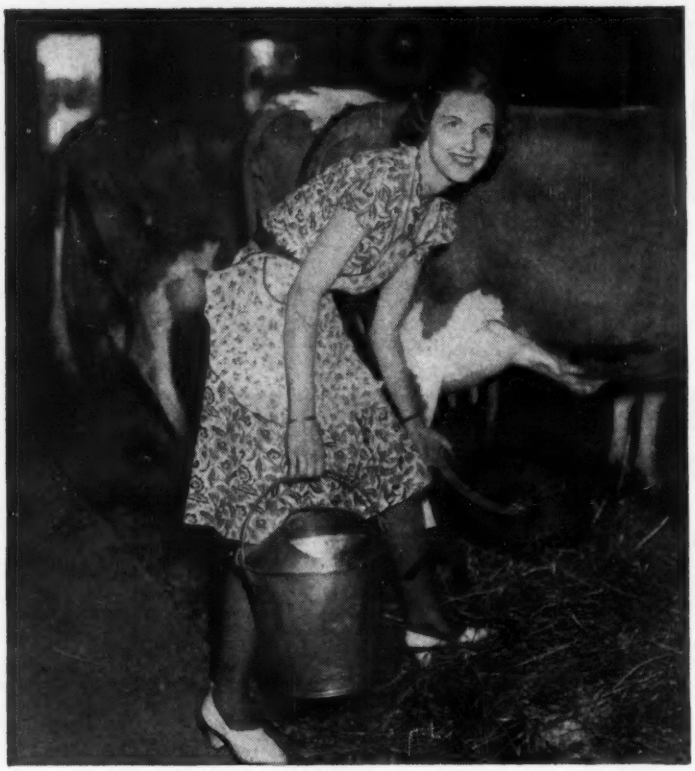
SYNTHETIC RESINS • CHEMICAL COLORS • PHENOLIC PLASTICS • INDUSTRIAL CHEMICALS

LIFE...ON THE



SURFACE ACTIVE AGENT M, GERMICIDAL OR ANTI-BACTERIAL AGENT, HAS MANY IMPORTANT POTENTIAL USES

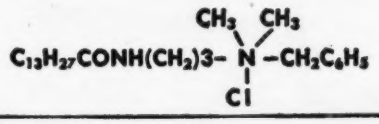
Surface Active Agent M is a bactericidal and germicidal detergent of a high degree of potency. Its use involves an entirely new and revolutionary approach to industrial sterilization.

Surface Active Agent M belongs to a class of products known as quaternary ammonium compounds, and its chemical name is myristamidopropyl dimethyl benzyl ammonium chloride. It is a cationic surface active agent. Anionics and cationics, if brought into contact in solution, will react and precipitate each other, an important fact in connection with their many applications.

Surface Active Agent M is easily applied or used. It is necessary only to dilute it with hot or cold water and then apply by spray, immersion, flushing, or wiping. The combination of freedom from toxicity and rapid anti-bacterial action provides a safe and effective means for controlling bacterial organisms.

Information on suggested uses for Surface Active Agent M and samples will be sent on request.

Surface Active Agent M

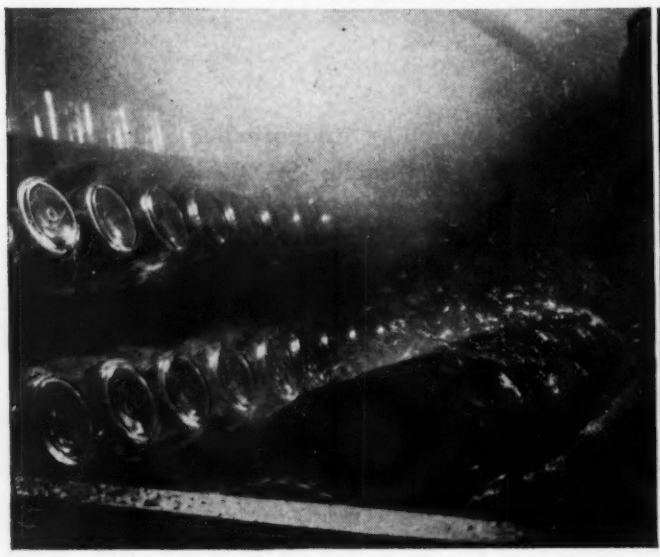


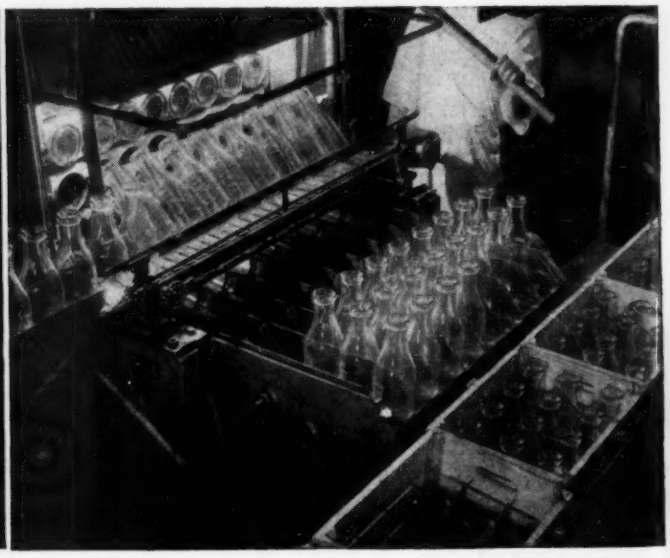
(*Above*) **AS A DISINFECTANT,** Surface Active Agent M can be used for the spraying of cow stalls, dairy barns, fowl coops, and for the sterilization of cows' udders prior to milking.

(*Below*) **AS A GERMICIDAL DETERGENT,** Surface Active Agent M should find extensive use in the dairy, soft drink, and brewery industries for washing and rinsing bottles and cans, cleaning floors, pasteurizers, cooling towers, and other equipment.

PROPERTIES OF SURFACE ACTIVE AGENT M

Appearance	tan liquid
Odor	solvent
Taste—0.5% solution	slightly bitter
Solubility at 30° C.	infinite
pH—1.0% solution	8.2
Wetting power (AEROSOL® OT 100%=100)	12.1
Surface tension at 0.05%	31.6
Detergency (0.25%)	good
Emulsifying power	some
Phenol coefficient at 37° C. on Staphylococcus Aureus	400—800
Sodium hydroxide tolerance	11.4%
Calcium chloride tolerance	10,000 p.p.m.
Foaming power	very good
Lathering power	good
Fungicidal power	fair





CHEMICAL NEWSFRONT

(*Right*) **TO MEET TODAY'S EXACTING COMPOUND REQUIREMENTS** for rubber products that must withstand the most rugged service conditions, such as this V-belt drive on a mechanical rotary oil drilling rig, neoprene stock compounders depend on the uniform quality of K & M Light Magnesium Oxide.

Produced by Keasbey & Mattison Company, one of America's oldest and most reliable makers of magnesia products, K & M Light Magnesium Oxide assures uniform dispersion because of its lightness and fineness.

Packaged in moisture-resistant containers, according to R.R.C.'s approved standard, it is distributed by American Cyanamid Company, manufacturers of a full line of controlled quality chemicals for the rubber industry. Samples will be sent on request.

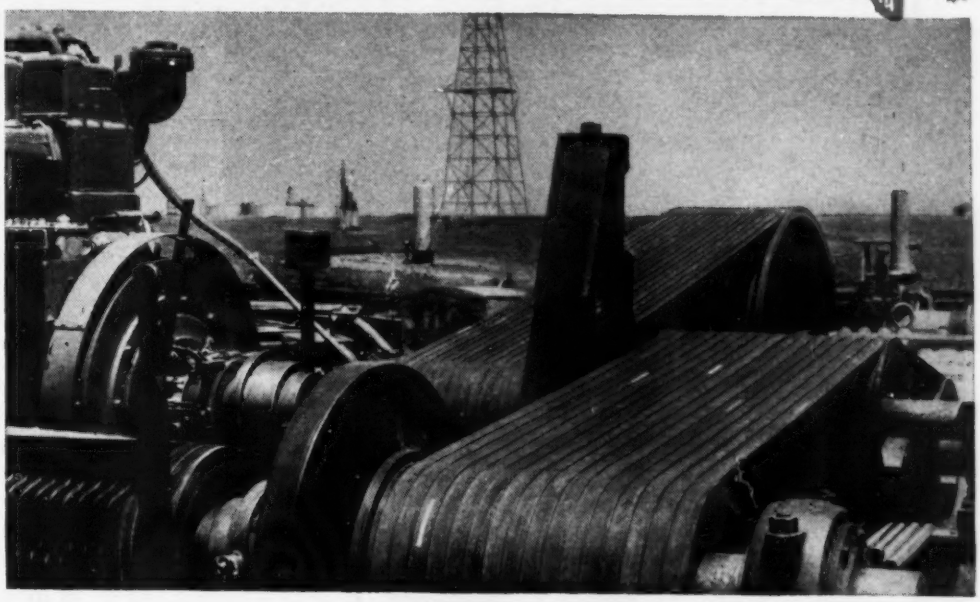


Photo courtesy L. H. Gilmer Company, Div. U. S. Rubber Co., Philadelphia, Pa.

(*Above*) **HERE'S NEWS IN FURNITURE!** Laminated plastic table tops, counter tops, and working surfaces for playroom, dining room, kitchen, or restaurant, made with LAMINAC* resin, product of Cyanamid's Plastics Division, are as easy to clean as they are colorful, as durable as they are decorative. Surfaces are hard, smooth, and glossy, resistant to water, beverages, and many chemicals.

*Reg. U. S. Pat. Off.

AMERICAN Cyanamid COMPANY Industrial Chemicals Division

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Mrs. Plushby wore sackcloth...and emeralds

Don't misunderstand. Mrs. Plushby can afford the best in clothes. But her costume might very well look like this if it weren't for *Caustic Soda.*

Conditioning of modern fabrics is only one of a great many uses of this versatile substance. It is equally important in the production of petroleum, paper pulp, and many industrial chemicals, and in the manufacture of such familiar products as soap, paper and Cellophane.

Wyandotte, with its extensive resources, facilities and experience, plays a major role in meeting the ever-increasing demand for Caustic Soda.

Wyandotte Chemicals Corporation is one of the world's great producers of soda ash, caustic soda, bicarbonate of soda, chlorine, dry ice, calcium carbonate, and other basic and intermediate organic and inorganic chemicals. Wyandotte also manufactures tremendous quantities of specialized cleaning compounds for business and industry.

Wyandotte
REG. U. S. PAT. OFF.

WYANDOTTE CHEMICALS CORPORATION
Michigan Alkali Division • Wyandotte, Michigan

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U.S.I. CHEMICAL NEWS

December ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1946

THE MONTH IN THE AUTOMOTIVE INDUSTRY

A new device to remove gum, varnish, and carbon in cylinders is produced . . . A new plant, manufacturing synthetic liquid motor fuel from farm residues, is placed in operation in this country . . . Surveys show that the production of gasoline from coal is practical but not yet competitive with production from crude oil . . . Lubricants containing ingredients for wetting metal surfaces tend to decrease the rate of wear in engines, according to a report . . . A motor fuel, said to be stable against gum formation, is patented . . . Placed on the market is a war-developed oil which is claimed to loosen deposits of soot, carbon, varnish, and sludge in the old engine in addition to lubricating . . . A new machine for repairing tires and other rubber products is manufactured . . . Successful tests are run on the production of synthetic gas from anthracite and pure oxygen . . . A new synthetic lubricant is prepared by adding butanol to 1,2 propylene oxide . . . New-type cables, insulated with vinyl plastics, are reported to resist the attacks of grease, oil, gasoline, and "corona" . . . Details are published of the "catarole" process for producing aromatic hydrocarbons from petroleum . . . Government research discloses that natural gas can be used successfully in Diesel engines.

Novel Process Prevents Acid-Fading in Textiles

Textiles which neither fade nor change color when exposed to acid fumes, such as the combustion products of coal or gas, are now possible, according to the claims made in a recent patent. Anti-fading qualities are imparted to the fabric by treatment with aqueous solutions of triethanolamine containing a solvent or swelling agent for the organic derivative of cellulose materials. Suitable swelling compounds are said to be ethyl alcohol, butyl alcohol, and acetone. Ethyl alcohol is reported to be employed in aiding the triethanolamine penetrate the textile material, and may be present in the aqueous solution in varying concentrations.

Methionine Is Found to Have Anti-Anemic Action

Rats made anemic by injections of carbon tetrachloride were treated successfully by methionine injections, according to a paper published recently by two French scientists. The methionine is said to have caused a rapid increase in red-cell count even though the administration of small doses of carbon tetrachloride was continued. Oral administration of methionine corrected anemia due to treatment with carbon tetrachloride or to a diet deficient in methionine, the authors state.

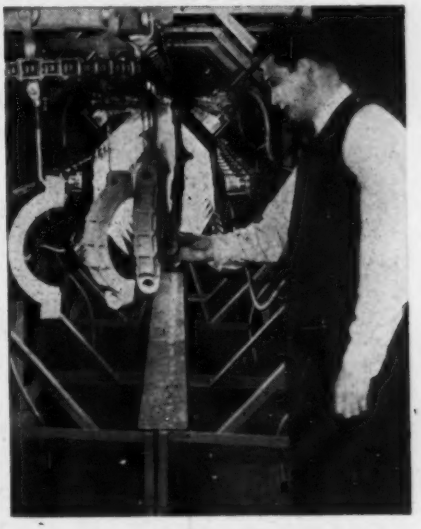
New Saccharin Synthesis

Saccharin has been commercially prepared from anthranilic acid (*o*-amino-benzoic acid), it was announced recently. The yield, based on this starting material, is 58-60 per cent, and the cost is as low as that of previously used processes, the report states.

Wide Use Seen for Organic Chemicals in Post-War Autos

Applications Include Antifreezes, Protective Coatings, Upholstery, And Insulating, Dewaxing, and Corrosion-inhibiting Compounds

Vital to the appearance and performance of the high-powered, sleek-looking cars now beginning to roll from the assembly lines are many types of organic chemicals. Applications of these versatile compounds range from today's color-rich, long-lasting finishes to materials that prevent the formation of corrosive substances in the fuel and lubricating systems. Outstanding U.S.I. contributions to the automotive industry include many of these important organic chemicals as well as proprietary products such as Super Pyro Antifreeze, Solox — a general purpose solvent, and PiB — an ignition insulation material.



Their surfaces finished hard and tough, these couplings emerge from the infra-red ovens. Many automotive coatings are now manufactured with the aid of U.S.I. resins, solvents, and plasticizers.

Coatings, Plastics, Upholstery

Many synthetic and natural resins, and solvents and plasticizers aid in the production of quick-drying, durable, attractive finishes which help speed the production of trailers, trucks, busses, streetcars, passenger cars, trac-

(*Continued on next page*)

Farm Products Are Source Of New Synthetic Fibers

Government laboratories throughout the country have developed new synthetic fibers from agricultural products and improved old ones, according to an announcement made recently. These fibers are not intended to replace natural fibers, but are expected to improve natural fibers when the two are mixed. All the experimental fibers developed so far are high in wet strength.

Most important of the new fibers is Savelon, manufactured from peanut protein. It has a light cream color and is said to be reminiscent of both silk and wool. Another new fiber is said to be manufactured from chicken feathers. Improvements have also been made in a fiber made from zein, a protein obtained from corn, and in casein fiber. The new zein fiber is stated to have a rich, creamy appearance and a dry strength almost equal to wool. The improved casein fiber is reported to be more uniform and more economical than its predecessor.

Fish Odor of Vitamins Destroyed by New Process

A method for removing undesirable tastes and odors of fat-soluble vitamin-containing materials such as fish oils and concentrates while retaining their potency, is announced in a patent issued recently. The patent describes the process as consisting of mixing the vitamin materials with crude vegetable oils and heating in an open vessel in the presence of an inert gas.

New Soap Preservative

The development of rancidity and discoloration in granular soap products is inhibited by a new product, according to the claims made in a patent issued recently. The inhibitor is described as a polyethylene polyamine.

The 1947 cars look better, ride better, thanks to the help of a wide variety of organic chemicals.

December ★ **U.S.I. CHEMICAL NEWS** ★ 1946

Organic Chemicals in Post-War Autos

(*Continued from preceding page*)

tors and other transport equipment. Many of these coatings, based on new alkyd resins, bake fast to produce a gloss that stands up under water, weather, oil, alcohol, and gasoline. The use of these products also imparts to the automotive finishes the important characteristics of hardness, toughness, mar-resistance and adhesion. Finishes of this type wash easily, and respond to polishing quickly.

U.S.I. Chemicals in the Automotive Industry

U.S.I. manufactures the following organic chemicals vital to the manufacture of today's automobiles, busses, trucks, and similar forms of transportation:

CHEMICALS — Ethyl alcohol, butyl alcohol, specially denatured alcohol, completely denatured alcohol, acetone, amyl acetate, butyl acetate, ethyl acetate, diethyl oxalate, diamyl phthalate, dibutyl phthalate, diethyl phthalate, natural and synthetic resins.

PROPRIETARY PRODUCTS—Super Pyro Antifreeze, PiB, Ansols, and Solox. (Registered trade marks of U.S.I.)

Important steps in the manufacture of many of the plastic and plastic-treated parts of the modern car require the use of U.S.I. organic chemicals. Solvents and plasticizers are frequently employed in the manufacture of molded plastic items, such as electrical fixtures, distributor heads, door handles, and dashboard instruments. The same products are used in the production of plastic-treated fabrics for upholstery. This new-type upholstery makes smarter, brighter colors practical, doesn't fade or change color, stays cleaner longer, and defies wear.

Boosts Performance

U.S.I. contributions to the high operating efficiency of today's cars include the improvement of the quality of gasoline and lubricating oil, the removal of cylinder carbon, and the protection of radiators against low temperatures. Organic chemicals are used to manufacture that well-known anti-knock compound, tetraethyl lead, and to dewax, purify, and refine lubricating oils. Recent studies from abroad have also shown that small amounts of diethyl oxalate inhibit the corrosion of metallic bearings.

Antifreeze protection is supplied by Super Pyro and U.S.I. completely denatured alcohol. These two types of antifreeze products will provide low-temperature protection suitable for all types of automobile cooling systems. Super Pyro also lessens the danger of overheating since it keeps the cooling system clean.

An ideal companion for Super Pyro Antifreeze in the automotive field is PiB, a unique insulating material which shows remarkable ability to protect electrical systems from moisture, wet weather, and many acids. This liquid product is applied by brush or spray on plugs, wiring, distributors, coil terminals, and batteries — and once the engine has been properly treated with PiB, it can be "hosed down," and it won't even miss.

Other Applications

Organic solvents are used in the preparation of synthetic rubber for the manufacture of tires and accessories. Small amounts of methyl, diethyl, or dibutyl phthalate have been suggested to increase substantially the load-carrying capacity of lubricants. Highly flexible, permanently transparent sheets for use in laminated safety glass can be formed from polyvinyl resins made from butanol. Butanol is also used in the manufacture of accelerators for rubber vulcanization.

Polyvinyl butyral, essential in the manufacture of the plastic interlayer for this shatterproof windshield, is made with butanol.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

A new sizing agent, developed due to shortages of corn and other starches, is described as a soluble resin, having all the superior qualities of the older sizing agents. **(No. 139)**

USI

A non-flammable oil, said to be suitable for use in aircraft, is reported to have been approved by the Naval Research Laboratory. **(No. 140)**

USI

To prevent discoloration of plastics, a new stabilizing agent has been developed. It is described as a liquid which prevents discoloration due to high temperature and exposure to sunlight. **(No. 141)**

USI

A new water repellant for textiles, papers, and ceramics is non-acid, and will not cause deterioration in the fibers of textiles or papers, according to the manufacturer. **(No. 142)**

USI

A new plasticizer for protein plastics is described as an amber-colored viscous liquid, said to give tough, flexible, permanent films. It is recommended for use in compounding synthetic coatings and adhesives. **(No. 143)**

USI

A new wood floor preservative, said to penetrate, seal, and finish all types of wood floors in only one application, is stated to be impervious to the action of water and alcohol. **(No. 144)**

USI

A new waterless cleaner removes dirt, grease, ink, rust-stains, and dried paint from hands merely by rubbing and wiping, the manufacturer states. **(No. 145)**

USI

A slide rule, reported to be accurate to 19 decimal places, is now being marketed. **(No. 146)**

USI

To protect wood products from swelling, a new process is announced which is said to produce a high degree of dimensional stability. **(No. 147)**

USI

To keep shipments from sliding in railroad cars, trucks and steamships, thus cutting transit losses, a new adhesive has been developed. Applied to the bottom surface of each container, it is alleged to have high sheer strength which prevents sidewise or lengthwise shifting, and low tensile strength which permits the easy release of each container by a sharp upward blow. **(No. 148)**

U.S.I. INDUSTRIAL CHEMICALS, INC.

60 EAST 42ND ST., NEW YORK 17, N. Y. U.S.I. BRANCHES IN ALL PRINCIPAL CITIES

ALCOHOLS
Amyl Alcohol
Butanol (Normal Butyl Alcohol)
Fusel Oil—Refined
Ethanol (Ethyl Alcohol)
Specially Denatured—all regular and anhydrous formulas
Completely Denatured—all regular and anhydrous formulas
Pure—190 proof, C.P. 96% Absolute
*Super Pyro Anti-freeze
*Solox proprietary Solvent
***ANSOLS**
Ansol M
Ansol PR

ACETIC ESTERS
Amyl Acetate
Butyl Acetate
Ethyl Acetate
OXALIC ESTERS
Dibutyl Oxalate
Diethyl Oxalate
PHTHALIC ESTERS
Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate
OTHER ESTERS
*Diatol
Diethyl Carbonate
Ethyl Chloroformate
Ethyl Formate

INTERMEDIATES
Acetoacetanilide
Acetoacet-ortho-anisidide
Acetoacet-ortho-chlorqnilide
Acetoacet-ortho-toluidide
Acetoacet-para-chloranilide
Alpha-acetylbutyrolactone
5-Chloro-2-pentanone
5-Diethylamino-2-pentanone
Ethyl Acetoacetate
Ethyl Benzoylacetate
Ethyl Alpha-Oxalpropionate
Ethyl Sodium Oxalacetate
Methyl Cyclopropyl Ketone
ETHERS
Ethyl Ether
Ethyl Ether Absolute—A.C.S.

FEED CONCENTRATES
Riboflavin Concentrates
*Vacatone 40
*Curbay B-G *Curbay Special Liquid
ACETONE
Chemically Pure
RESINS
Ester Gums—all types
Congo Gums—raw, fused & esterified
*Aroplaz—alkyds and allied materials
*Arofene—pure phenolics
*Arochem—modified types
Natural Resins—all standard grades
OTHER PRODUCTS
Collodions
Ethylene Glycol
Nitrocellulose Solutions
Ethylene Urethan
dl-Methionine

*Registered Trade Mark

Printed in U.S.A.

Greater Service IN CELANESE CHEMICAL DEVELOPMENT

The commissioning of the second phase of the large new chemical plant at Chemcel near Bishop, Texas, marks an important step in the Celanese program of expansion in the field of synthetic organic chemistry. Large scale production of basic industrial chemicals from natural gas is now in operation. Present output includes formaldehyde, acetaldehyde, acetic acid, methanol and acetone.

The unique processes and modern equipment operating at the Chemcel plant afford opportunity for Celanese to meet the requirements of industries for many new chemical derivatives, and to aid individual industries in developing new and improved manufacturing methods. Celanese Chemical Corporation, a division of Celanese Corporation of America, 180 Madison Avenue, New York 16, N. Y.

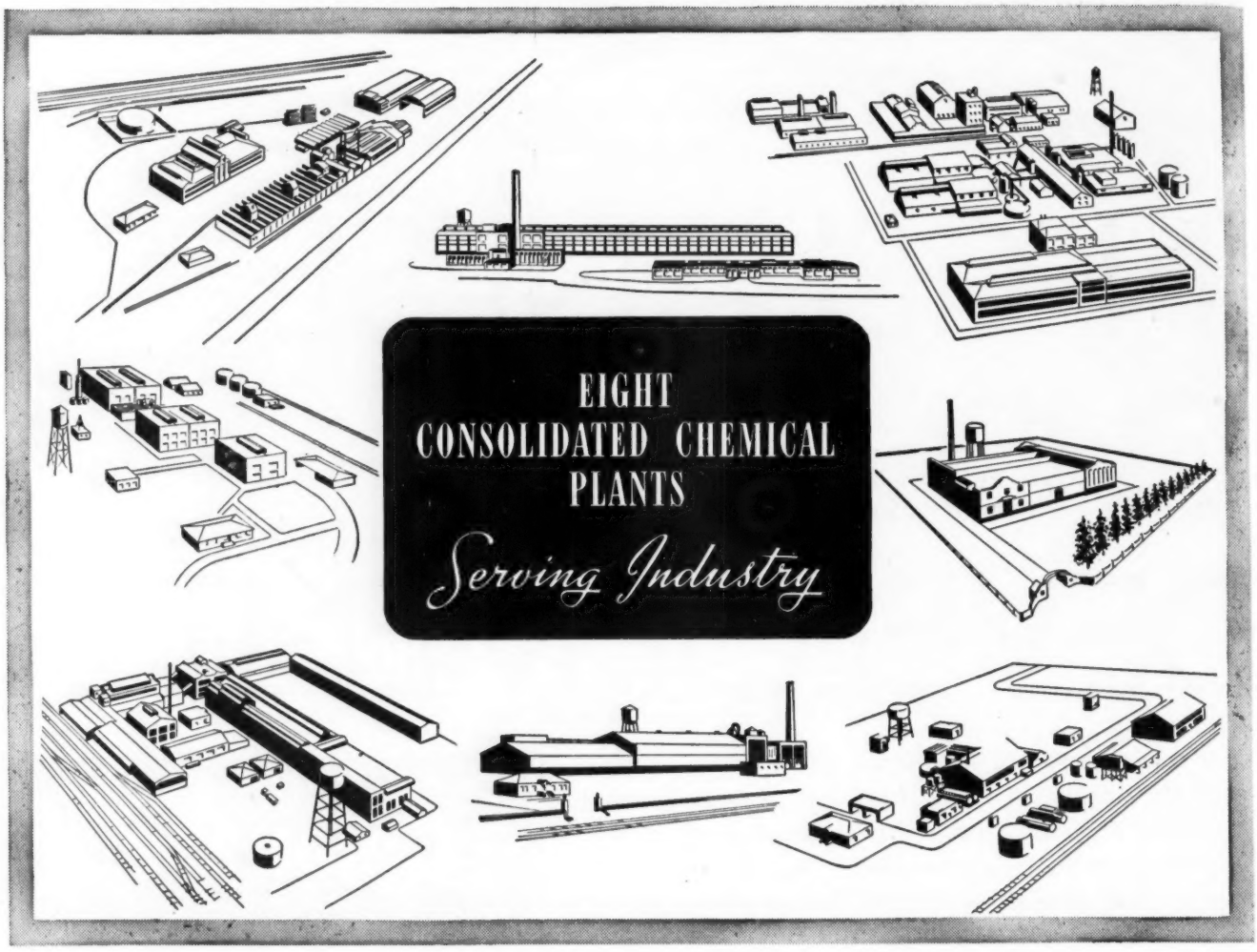
Celanese* Chemicals

FORMALDEHYDE
ACETALDEHYDE ACETIC ACID
METHANOL ACETONE
ORGANIC PHOSPHATES
PLASTICIZERS
INTERMEDIATES DYESTUFFS

Celanese Synthetics*

TEXTILES . . . . PLASTICS . . . CHEMICALS

*Reg. U. S. Pat. Off.



Since its beginning sixty-eight years ago, Consolidated Chemical Industries has progressively expanded its facilities.

Today, Consolidated occupies an important place in the industrial chemical field.

Ever alert to the importance of modern facilities and the latest developments in manufacturing methods, this Company has so broadened its scope that there are few industries it does not serve, directly or indirectly.

The eight Consolidated manufacturing plants are strategically located and geared to give prompt service.

Products manufactured by Consolidated include:

SULPHURIC ACID	**AMMONIA ALUM**	**BONE GREASE**	**EXTRACTED BONE GLUE**
ELECTROLYTE	**POTASH ALUM**	**BONE OIL**	**MEAT SCRAP**
MURIATIC ACID	**POTASSIUM SULPHATE**	**BONE GLUE**	**TANKAGE**
SALT CAKE	**BONE BLACK**	**HIDE GLUE**	**TALLOW**
TEXINE ACID INHIBITOR	**BONE MEAL**	**DIGESTA BONE MEAL**	**FLESHING GREASE**
ALUMINUM SULPHATE	**BONE FLOUR**	**EDIBLE GELATIN**	

Consolidated's staff of chemists and engineers is always available to give able technical assistance.

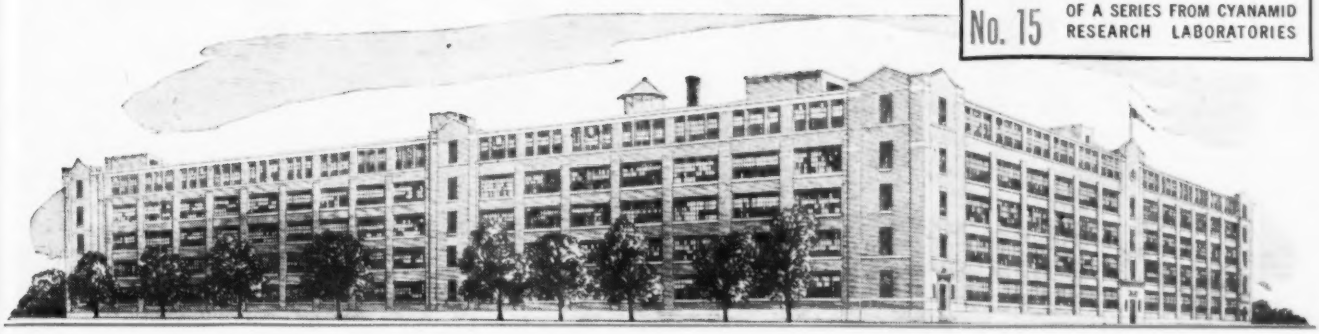
Your inquiries for prices and technical service will receive prompt attention.

CONSOLIDATED CHEMICAL INDUSTRIES INC.

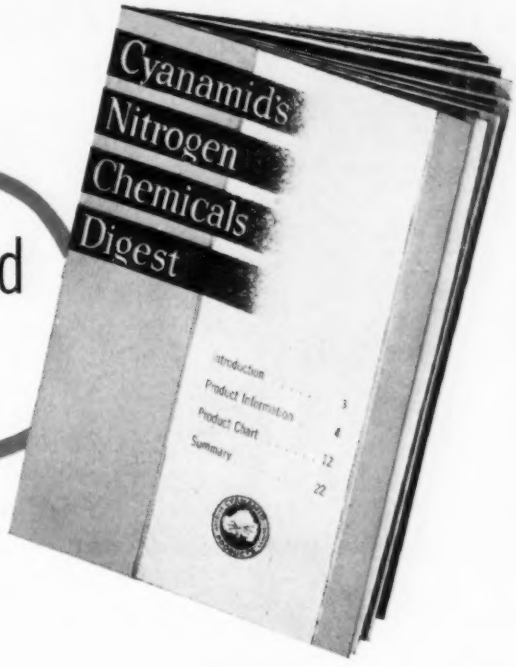
SALES OFFICES: SAN FRANCISCO, HOUSTON, NEW YORK

PLANT LOCATIONS: SAN FRANCISCO, CALIF.; WOBURN, MASS.; BASTROP, LA.; BATON ROUGE, LA.; FORT WORTH, TEXAS; HOUSTON, TEXAS; LITTLE ROCK, ARK.; BUENOS AIRES, ARGENTINA

No. 15 OF A SERIES FROM CYANAMID RESEARCH LABORATORIES



A digest of Cyanamid's newly released Organic Nitrogen Chemicals



This booklet has been compiled by our technical staff to describe in condensed form a number of many interesting Nitrogen Chemicals that have been advertised during the past year. Included, for example, will be comments on the physical and chemical properties, the reactivity and possible uses of such products as:

Acrylonitrile
Ethylene Cyanohydrin
Glycolonitrile
Lactonitrile
Isopropoxypropionitrile
Dicyandiamide
Guanidine Compounds
Phenyl Biguanide Hydrochloride
Guanylurea Sulphate
Dithiobiuret

The booklet contains a composite product chart illustrating the relationship of the chemicals now available and many that we have to offer in coming months.

Every chemist should have this handy reference on hand. Fill in and mail the coupon for your copy.

AMERICAN
Cyanamid
COMPANY
Industrial Chemicals Division

Headquarters For Nitrogen Chemicals

MAIL COUPON FOR YOUR COPY

American Cyanamid Company
Section ON, Synthetic Organic Chemicals Dept.
30 Rockefeller Plaza, New York 20, N. Y.

Gentlemen: Please send me a copy of your new booklet "Cyanamid's Nitrogen Chemicals Digest"

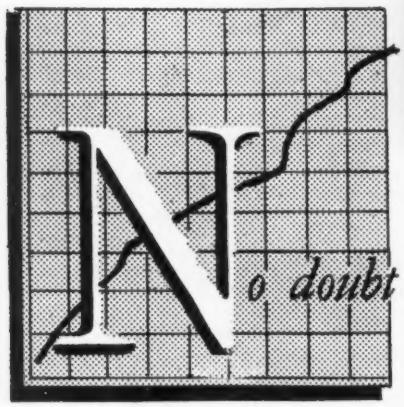
*Name*_____

*Position*_____

*Company*_____

*Address*_____

FOR FATTY ACIDS AND THEIR DERIVATIVES THE TREND IS TO HARDESTY



The trend to HARDESTY for fatty acids and their derivatives started when our first shipment was made. It was accentuated during the war when HARDESTY provided many answers to problems created by shortages of imported raw materials. And even now, many manufacturers who followed the trend to HARDESTY simply as a war time expedient have decided—on the basis of superior performance for less cost—*never* to go back to high priced imports.

There's a reason behind this trend to HARDESTY — above and beyond HARDESTY'S dependable quality fatty acids . . . HARDESTY'S research laboratory and technical service department are constantly demonstrating to manufacturers how they can save money by first consulting HARDESTY on a new problem.

HARDESTY products are made in various grades to meet the requirements of the chemical, cosmetic, soap, rubber and other industries. At present it is impossible to render the traditional Hardesty Prompt Service but if you have a problem, our knowledge and experience in fatty acids and their derivatives are ready to go to work for you. We can show you with information and samples why it pays TO KEEP IN TOUCH WITH HARDESTY. W. C. HARDESTY COMPANY, 41 East 42nd Street, New York 17, N. Y. Factories: Dover, Ohio; Los Angeles, Calif.; Toronto, Canada

HARDESTY PRODUCTS. STEARIC ACID • RED OIL • GLYCERINE • STEARINE PITCH • WHITE OLEINE • HYDROGENATED FATTY ACIDS • ANIMAL AND VEGETABLE DISTILLED FATTY ACIDS

W·C· HARDESTY COMPANY

Catalysts by Baker...

SUPREME TEST OF UNIFORMITY

Baker, for nearly half a century, has been known for its analytical control of reagent chemicals. *The actual analyses on the labels* of these laboratory chemicals have shown, year after year, higher and higher degrees of purity.

The making of catalysts for industry differs in one respect. Purity is not always the only important factor. But uniformity to a pre-established quality from lot to lot and strict accuracy of analysis are vital.

For catalysis is a delicately balanced and painstakingly achieved process. Once the chemical composition is determined, adherence to specifications must be rigid, permanent, and uncompromising.

The J. T. Baker Chemical Company has been privileged, over a period of many years, to supply, uninterruptedly, chemicals especially prepared for catalytic application. These catalysts have been used in many of the nation's leading industries—industries such as plastics, the vegetable, oil and fat industries, organic solvent producers, petroleum chemical manufacturers, synthetic rubber producers and others.

To protect the interests of the customer, many of these chemicals are made on a confidential basis. Many are even code-numbered for the customer's protection. But all have one thing in common—so important to a manufacturer who needs a catalyst. The day by day and lot by lot analyses meet the supreme test—uncompromising uniformity.

If you need chemicals for catalysis, or any application where predetermined standards of purity are required, the J. T. Baker Chemical Company invites you to discuss your requirements with them in confidence.

J. T. Baker Chemical Co., *Executive Offices and Plant:* Phillipsburg, N. J.
***Branch Offices:* New York, Philadelphia, Boston and Chicago.**

Baker's Chemicals

C. P. ANALYZED • FINE • INDUSTRIAL

Chemicals

FOR THE PROCESS INDUSTRIES

THERE'S no substitute for the word experience. It's well to bear in mind that Turner has been supplying chemicals to the process industries for over 75 years. Call on us the next time you're in the market and you'll be quick to say that Turner is *"long on quality and strong on service."*

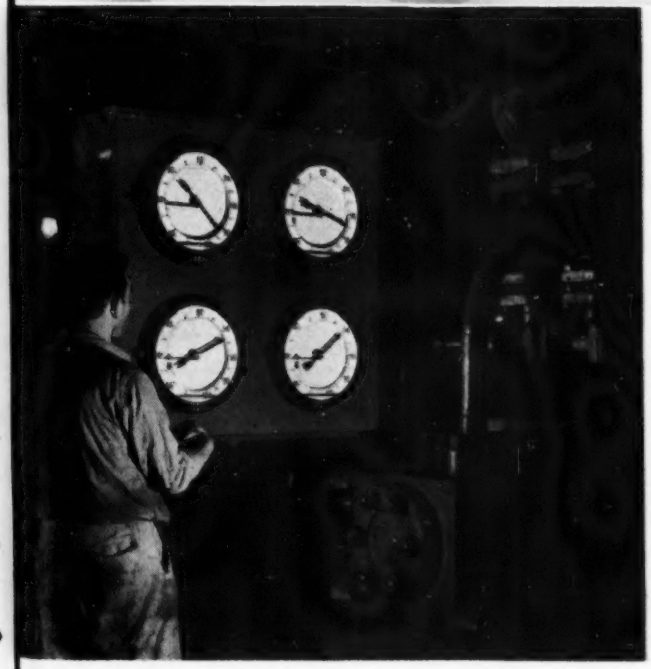
TURNER CHEMICALS

- Ammonium Sulphate (Refined)
- Ammonium Persulphate
- Borax
- Caustic Soda (Flake and Solid)
- Caustic Potash
- Sodium Chloride
- Carbonate of Potash
- Potassium Persulphate
- Copper Carbonate
- Bromides (Sodium — Potassium — Ammonium)
- Phosphorus Oxychloride
- Phosphorus Trichloride
- Stearates (Aluminum—Calcium —Zinc)

JOSEPH TURNER & CO

83 Exchange Place, Providence, R. I. **RIDGEFIELD, NEW JERSEY** 435 N. Michigan Ave., Chicago 11, Ill.

DIAMOND AUTOMATIC PROCESS CONTROL KEEPS PRODUCTION "ON THE BEAM"



pical of instruments used in Diamond
tomatic Process Control is this continu-
s analyzer in the Chlorine Plant.

Sentinels that never sleep watch every step of Diamond Alkali's manufacturing processes, protecting the uniformity and quality of Diamond products.

Many processes are conducted in tanks, towers or kilns where there is little opportunity for periodic sampling or visual inspection. But the probing, sensitive "fingers" of indicating or recording instruments reveal important facts as to conditions within.

With this data Diamond operators carefully watch and control the development of each process, thus insuring the high quality of the finished product.

ALKALI

DIAMOND ALKALI COMPANY

Pittsburgh 22, Pa. and Everywhere

...its Natural Resins again!

Primary markets in the Far East have opened up again . . . and U.S.I. is once more bringing Damar, Batu, Black East India, Pale East India, and other popular natural resins into this country.

As a manufacturer of *synthetic* resins as well, U.S.I. is once again able to offer you a complete resin line.

Write or phone today for samples and further data.

SYNTHETIC RESINS

ESTER GUMS	*all types*
CONGO GUMS	*fused and esterified*
***AROPLAZ**	*alkyd and allied materials*
***AROFENE**	*pure phenolics*
***AROCHEM**	*modified types*

NATURAL RESINS

Pale East India	Manila (Alcohol-Soluble)
Batu	Elemi
Black East India	Red Gum
Pontianak	Congo—Raw
Loba	Kauri

Damar, Batavia and Singapore

U.S.I. INDUSTRIAL CHEMICALS, INC.
60 East 42nd Street New York 17, N. Y.
BRANCHES IN ALL PRINCIPAL CITIES

A large new plant unit for the production of the Ethyleneamines is now being built by Carbide and Carbon Chemicals Corporation. Early in 1947, greatly increased quantities of these important intermediates will be available. Here again is the "success story" of products developed a few short years ago taking on even more widespread applications in industry.

These extremely versatile intermediates bear further investigation especially if you are working in the fields of textile, pharmaceutical, resin, or petroleum chemicals. For the present, limited commercial quantities of any of these can be supplied for product development work.

The Ethyleneamines family include the following:

Ethylenediamine — $NH_2CH_2CH_2NH_2$

Aminoethylethanolamine — $NH_2CH_2CH_2NHCH_2CH_2OH$

Diethylenetriamine — $NH_2CH_2CH_2NHCH_2CH_2NH_2$

Triethylenetetramine — $NH_2(CH_2CH_2NH)_2CH_2CH_2NH_2$

Tetraethylenepentamine — $NH_2(CH_2CH_2NH)_3CH_2CH_2NH_2$

Information on the specific properties and uses for the Ethyleneamines is contained in the Amine booklet, F-4770A. Call or write our nearest local office for your copy.

CARBIDE AND CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

UCC

30 East 42nd Street, New York 17, N. Y. Offices in Principal Cities

Distributed in Canada by Carbide and Carbon Chemicals, Limited, Toronto

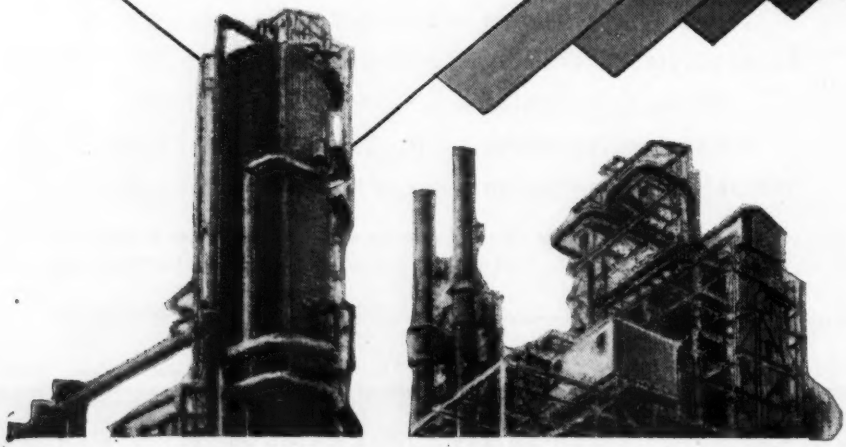
SYNTHETIC ORGANIC CHEMICALS

From the catalog of Barrett Basic Chemicals

PHTHALIC ANHYDRIDE

Clean white flaked material used widely as the principal dibasic acid for the production of alkyd resins, for automotive and other enamels and coatings. It is used as a starting material in the manufacture of dyestuffs, pharmaceuticals, plasticizers and insectifuges.

Solidification point	130.5° C Minimum
Solid color	Pure white
Molten color	Max. 55 Hazen
Insoluble in water	0.01% Max.
Availability	Light wood barrels even net weight 275 pounds and reinforced paper bags, even net weight 80 pounds.



THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

In Canada: The Barrett Company, Ltd., 5551 St. Hubert Street, Montreal, Que.

Barrett

Take a Tip From the Products You Use Every Day...

They're made with the aid of BECKMAN pH CONTROL!

WHAT ABOUT YOUR PRODUCT?

FEW PEOPLE—even those in industry themselves—realize the many diversified ways Beckman pH Control is being used to cut costs, reduce waste, improve operating efficiencies and insure a more uniform quality in dozens of products of daily use. For example . . .

The gasoline you use was probably refined with the aid of Beckman pH Control. Major refineries use Beckman pH Equipment to control the acidity of their processing operations, thus, not only improving the product, but also minimizing corrosion of costly plant equipment.

The paper you read in your magazines and books, as well as that which you use in your own catalogs and literature, are both made under the close control of Beckman pH Equipment. The paper mills manufacturing the finer qualities of paper use Beckman pH Control to regulate acidity in their processing operations and to insure more uniform printing qualities in the finished paper.

The sugar you eat was undoubtedly refined under the close control of a Beckman pH instrument—for accurate pH control has become an indispensable part of every well-managed sugar refinery.

The suit you wear, as well as your sox, shirt and other textiles you and your family use were probably produced with the aid of Beckman pH Control. It insures color-fastness, more uniform quality, greater strength in the finished fabric.

WHY NOT YOUR PRODUCT? Example after example can be cited where the job is being done better *for less* by means of Beckman pH Control. Chances are in *your* plant there are many important savings to be made through the installation of Beckman pH Control. Wherever there's water, there's pH—whether in chemical solutions, fluid pulps, moist pastes, sludges, industrial wastes or vat and tank processes. And wherever water or water solutions are used, chances are product quality can be improved, waste reduced and operating efficiency increased through the use of Beckman pH Control.

Why not find out about *your* product? Our trained engineering staff will be glad to work with you in recommending what can be done—possibly is already *being* done—in your particular field of industrial operation. *Beckman Instruments, National Technical Laboratories, South Pasadena 17, California.*

FACTS YOU SHOULD KNOW ABOUT BECKMAN pH EQUIPMENT

...that Beckman pioneered modern glass electrode pH equipment, transforming the cumbersome laboratory apparatus formerly used into a compact, practical portable instrument that paved the way for today's simplified pH measurement and control.

...that the first completely automatic glass electrode pH indicator, recorder and controller was pioneered by Beckman. Operating entirely without batteries, this instrument made automatic process control accurate, convenient, practical—and is today widely used in all parts of the world.

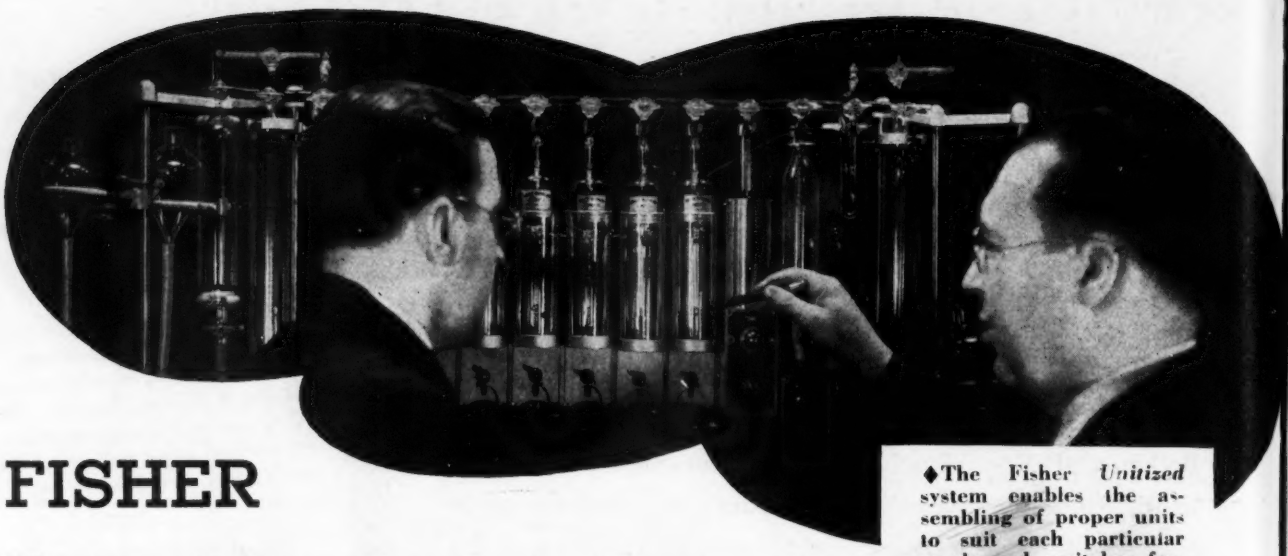
...that the only High Temperature Glass Electrode system available today is a Beckman achievement. This electrode system for the first time, enables continuous pH measurements to be made at temperatures up to 212°F (100°C) and is of tremendous value wherever hot process fluid must be controlled.

...that the only High pH Glass Electrode system is also a Beckman development. This is the only glass electrode that can be used to measure high pH values even in the presence of sodium ions... and extends the usefulness and accuracy of glass electrode equipment to many industries where alkaline solutions in combination with sodium ions have heretofore presented difficulties.

The above are only a few of many developments that make Beckman pH Equipment the only pH instruments embodying every modern advancement in the field of pH measurement and control.

FREE..."What Every Executive Should Know About pH"—a helpful, non-technical booklet containing much valuable information on the subject of pH—what it is—how it is used. Send for your copy today.

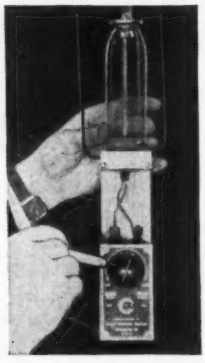
BECKMAN INSTRUMENTS CONTROL MODERN INDUSTRIES



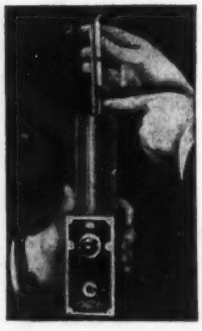
♦The Fisher *Unitized* system enables the assembling of proper units to suit each particular need; each unit has features which facilitate manipulation and more accurate results.

FISHER

Unitized Gas Analysis Apparatus



♦The Slow Combustion Unit *completely* oxidizes methane and ethane safely and conveniently.



♦A thermostat *automatically* maintains the proper temperature in the Fractional Combustion Unit.

Provides Ease of Operation . . . . . More Accurate Results

Technical and precision models of the Fisher Unitized Gas Analysis Apparatus are available for analyzing mine air, flue, blast furnace, producer, coal, natural and tunnel gases. Any number of desired units can also be assembled from standardized and interchangeable parts of the apparatus.

♦The simple means which units are combin to analyze for as many 8 components of a gas.

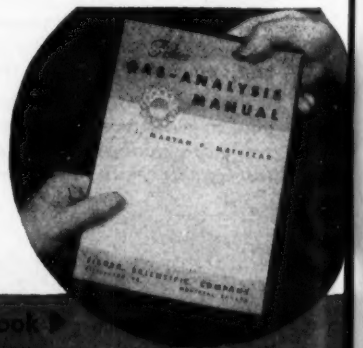
♦The reliable, sinki ball valve automatica controls gas flow w a minimum of stopc manipulation.

Units Can Be Added as Required

The Fisher Unitized Gas Analysis System is as convenient as the Orsat system, as flexible as the Hempel system and more accurate than either. The different units can be joined to make a complete, compact apparatus for a particular use, or other units can be added to an assembly to make a more complete analysis.

A Few Other Features of Fisher Gas Apparatus

All parts fully accessible—Not restricted to one-piece manifold—All parts standardized and interchangeable—stopcocks have identical three-way construction—Manifold design permits easy flushing and cleaning—etc., etc.



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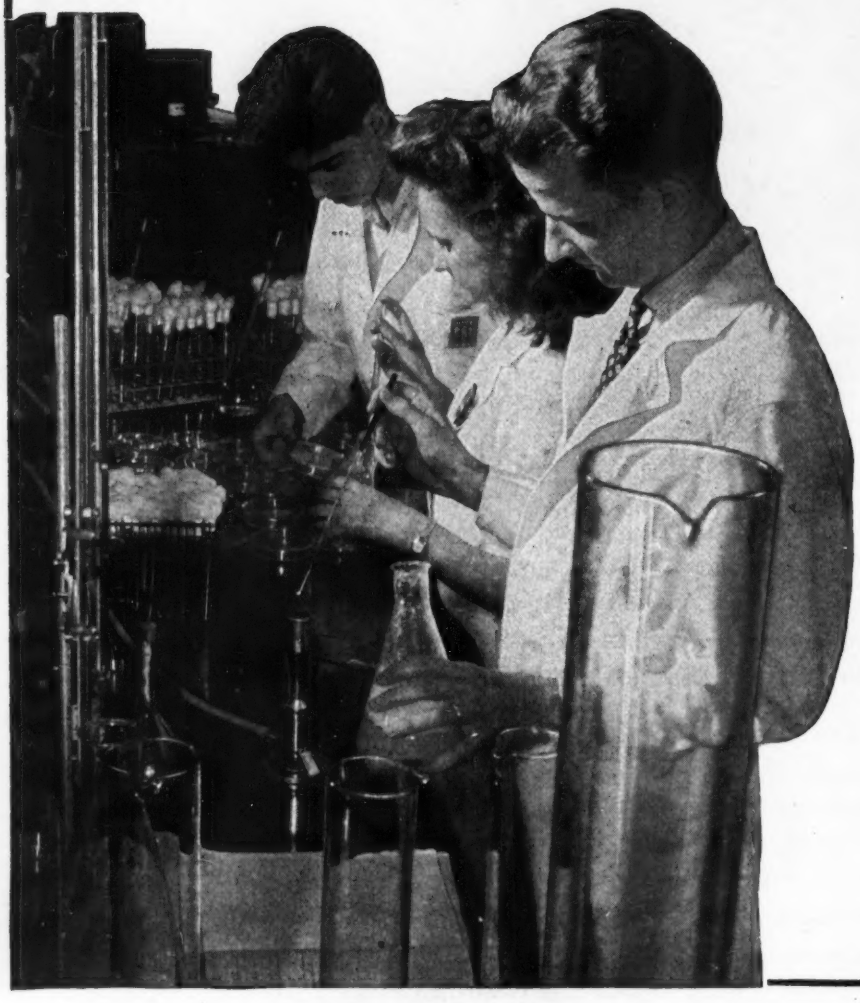

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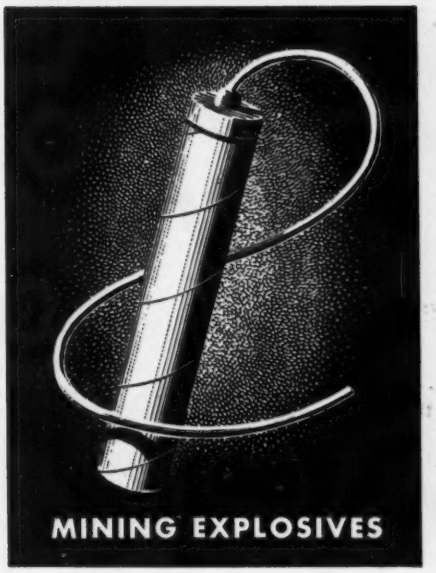

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Something to Sell

by ROBERT L. TAYLOR, editor

IT WOULDN'T BE A BAD IDEA for American business and industry to recognize the fact that the free enterprise system is on trial today, both at home and abroad, the November election results notwithstanding. This is something of a paradox, considering the war record of American industry, but it is true.

Private industry has been repudiated in France. It is on the wane in England. Only last month the conservative London Economist voiced concern over the "rapid" relinquishment of economic controls in this country and the Republican pledge of a return to the principles of a free economy. Does this mean, asked the Economist, that we are to see the return of a series of booms and depressions in the United States, with all their attendant evils and repercussions on the economy of the rest of the world?

Here at home there is still a tendency to look to Washington for aid in our economic troubles. After eight consecutive years that could be called prosperous by almost any measurement, we have a Reconstruction Finance Corporation that is still lending money. We have labor unions that are forcing government sanction of unjustified and exorbitant wage increases. There is latent fear of impending depression and loss of jobs. The people would like to believe in freedom, but they aren't 100 per cent convinced.

Chemical companies have much at stake in helping to promote free enterprise. Most of them owe a major part of their success today to the stimulus of free competition—healthy competition—among themselves and with other industries. The freedom to conduct research without restriction, and to enjoy—and plough back if desired—the fruits of that research, is basic not only to chemical industry progress but to the entire material progress of all Americans.

Chemical companies must help convince the public that a system which has made possible the highest living standards ever attained in any country at any time, is the best system. Business and industry under no other system and in no other country can show the same widespread and considerate treatment of employees. American business, despite the many aspersions cast on it, is not predatory in character. It is anxious to operate in the public interest.

The people need to know this. More than that, they need to believe it—and to believe *in* it. They need to be sold, and they can be sold. Industry must stop pussyfooting and let the people know what private enterprise is giving them. What's-in-it-for-me is still the single most powerful consideration in determining the actions of people.

It is not enough to tell the people that a free chemical industry had a tremendous lot to do with winning the war. We must tell them also how it has helped make Americans the best fed, best clothed, and best housed people in the world. We must tell them and show them that makers of chemicals have raised prices but 13 per cent since 1939 while raising wages five or six times that much; that chemical companies are introducing new products at the rate of some 500 a year to help make living easier and pleasanter in America and throughout the world; that they expect to invest millions of dollars in new plants and equipment over the coming year as evidence of their faith in America and the free enterprise system.

There are many ways and means of doing this. The public gets most of its information from the press. With the war over, newspaper reporters can again be invited to plants. Standard Oil Company of Indiana recently presented a brief informative lecture on the petroleum industry before taking reporters in to inspect its new cat cracker. The Dow Chemical Company staged a special press preview in New York of its new motion picture "Treasure from the Sea." Other companies have used paid space in newspapers, magazines and on the radio to bring the record of private industry to the attention of the public. Speeches before public groups, and simply having facts at hand to offer in private conversations, all contribute and need not make unreasonable demands on personal time and effort.

The enterprise system is not perfect, but it still has more to offer Americans than any other we know about. What seems indicated at the moment is a greater cooperative effort to strengthen its weak spots, combined with a good selling campaign of the what's-in-it-for-me variety. Companies which have helped show the world what chemistry in partnership with private enterprise can do, can and should contribute heavily to such a campaign.

Coal Is Not the Only Source of Power

Is COLLECTIVE BARGAINING failing to maintain industrial peace? In light of Mr. Lewis' and other labor leaders recent conduct at the bargaining table, the answer seems to be yes.

If such is the case, is it not high time to examine the possibility of obtaining our fuel supply by means which can not be so readily disrupted by labor squabbles?

Visionary? Possibly. Practical? Probably not immediately at least. Desirable? Emphatically yes, insofar as it may prevent disruption of our entire economic fabric at periodic intervals. No, insofar as it will pull some of our best research and development brains from the job of *improving* man's lot.

In any case, some means of combating coal's periodic interruptions of the functioning of our economic system must be arrived at and competition appears to be the only way.

Much press lineage has been expended on the possibility of conversion of the Big and Little Inch pipe lines to the transportation of natural gas to the Eastern Seaboard to serve as a competitor to coal. This would aid, certainly, but inasmuch as it would supply only a few percent of the BTU's required, it is far from a solution.

Recently it was noted that the Alabama Power Company is considering the underground gasification of coal, a process often discussed in the Russian press. This may supply a partial answer, but it suffers from the triple disadvantages of high capital cost, loss of heat in the gasification reaction, and a requirement for a special rock formation which will allow collection of the gases formed. This latter type of geological structure is not too common.

Finally there is the favorite of the Sunday supplements—atomic power. Here, at least, is a potential complete substitute for coal in the generation of power, not a partial palliative as in the case of the Big and Little Inch and underground gasification.

A few more surrenders to Mr. Lewis and the rail transport unions, and the $10 per ton figure at which atomic power appears to be competitive with coal will be reached. One or two more such disruptions as have occurred during the past year should restore to this project some of the priority it had during the war. Mere knowledge of the existence of such a replacement threat should do much to tame shaggy, belligerent Mr. Lewis.—HWZ.

Specialties Can Be Profitable, But . . .

THE MANUFACTURE OF CHEMICAL specialties has long been an attractive business. The apparent profit potentials are great. And more and more makers of basic chemicals have decided that it is a fruitful field well worth cultivation. They look at the price at which they sell their TSP, carbon tetrachloride, etc., in barrels or drums, and then consider the much higher price tag which the same materials carry in small retail packages. The conclusion is obvious. There is much money to be made in the specialties field.

But one important factor is often overlooked. All pastures appear lush and green to the casual glance. Too frequently chemical manufacturers reason simply —our raw materials costs are low; success is assured.

This is specious reasoning when applied to specialties. Raw material costs are not the major item. A thorough knowledge of consumer marketing techniques is the prime requisite. And marketing methods are very different from those used in selling chemicals to industry. A good industrial sales organization can fail miserably in promoting retail items.

This fact, as well as many others, must be well considered. Profits can only be realized if such special experience is available to the organization.—WAJ.

Good Environment or Labor Turnover—Which?

IT IS GRATIFYING TO NOTE that more and more concern is being felt by top management in the chemical industry for the health and happiness of their technical and operating personnel.

Dr. R. W. Cairns, assistant director of research of Hercules Powder Company, told a recent American Chemical Society audience that chemical companies increasingly are locating research laboratories where "the environment for progressive research in new fields will stimulate imaginative and creative thinking." He continued by citing an example of this movement —the Hercules Experiment Station, which is "situated on a landscaped hilltop in the rolling and wooded Delaware countryside. In this campus-like atmosphere, far removed from the dirt, noise and fumes of manufacturing operations, over 90 per cent of the fundamental and scouting research is performed."

Especially now is such farsightedness not only commendable, but profitable as well. The shortage of technically trained men—a shortage which will very likely continue for several years—has created an "employees' market." It is necessary now, as never before, for employers to use every possible inducement both to get and to hold men of high caliber.

Salaries always have been and probably always will be a major inducement; but starting salaries for men just out of school are pretty well standardized. The type of work differs little from one laboratory to another. The congeniality of superiors and fellow-workers is a major factor in keeping a man on the job, but an unknown quantity to the applicant. None of these, then, can affect a prospective employee's decision so much as the kind of environment in which he is expected to work and live.

Labor turnover is an expensive proposition. In these days a company may well sacrifice the efficiencies and conveniences of having the laboratories near the plant, if need be, in order to provide the laboratory personnel with a pleasant, satisfying environment. What does it profit an employer if he have the best equipment and the most economical processes yet lose his workers?—HCEJ.

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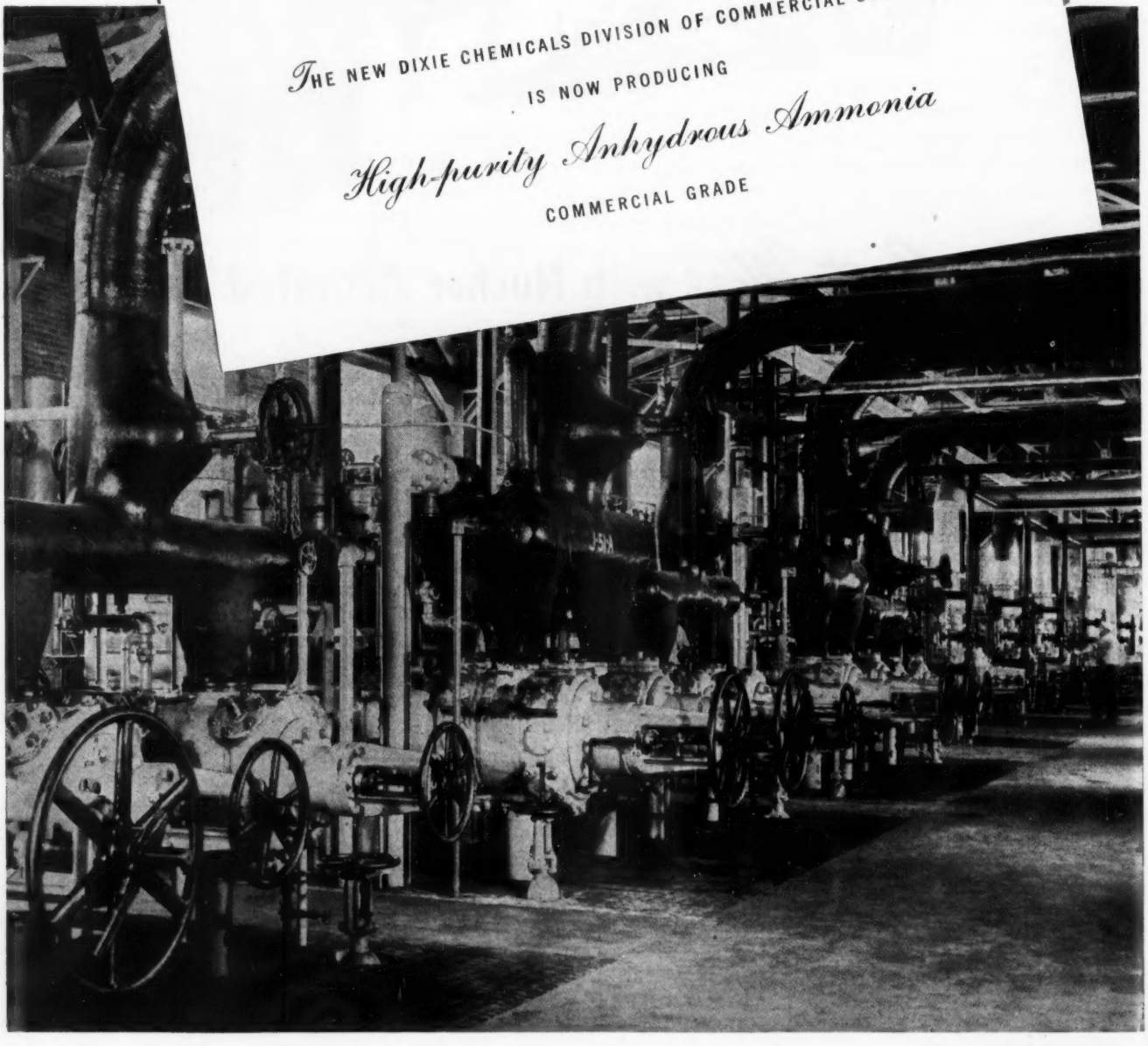


Chemical Industries
DECEMBER, 1946

PSYCHOLOGICAL TESTS Aid Personnel Selection in the Chemical Industry

by DAVID W. COOK,* Industrial Relations Department,
General Aniline and Film Corp., New York, N. Y.

THE PSYCHOLOGIST HAS MUCH TO CONTRIBUTE TO THE CHEMICAL INDUSTRY in providing tests and standards for selection of personnel. These are not the finger and manual dexterity tests usually associated with psychological testing but job knowledge tests to provide objective evidence concerning the candidate's ability to handle the job in question.

THERE are probably some executives in the chemical industry who believe that psychological testing can contribute little to the running of that industry. One factor which may explain this belief is that there has been a lot published about assembly tests, finger and manual dexterity tests for machine operators, etc., but not too much concerning the chemical industry. Realizing that the chemical industry does not have assembly lines, minute inspection jobs or large numbers of employees performing hand operations on small piece parts, these executives may reason that because the chemical industry is different, tests won't "work." Thus far their reasoning is sound and logical—tests of finger and manual skill rarely "work" in the chemical industry. There are, however, many other types of tests which the psychologist has up his sleeve, and it is our purpose here to show how these tests have "worked" in chemical industries.

PSYCHOLOGIST'S POINT OF VIEW

The following analogy illustrates the psychologist's position in the chemical industry or in fact any kind of industry. Let us assume that you were going to install some new machines in your plant. Before you bought those machines you would have your engineering department ascertain several things—what kind of a job the machines could do, how fast, at what cost, cost of repairs or parts, the advantages of one make over another, and many other facts. When the engineers finished their investigation you would have some sound evidence upon which to base your decision as to what make of machine to buy. The psychologist asks industry to use the same approach in selecting its personnel—not to base its decision upon subjective opinion or hunches but upon *objective* evidence. Tests are one of the important methods for securing the evidence we need in order to make such decisions.

SPECIAL TESTS ARE REQUIRED BY THE CHEMICAL INDUSTRY

The main difference between the chemical industry and any other industry as far as testing is concerned, lies in the type of test found most useful. For selecting workers for run-of-the-mill jobs in chemical plants, job knowledge tests have proved most valuable. As previously mentioned, in general there are no assembly lines, no minute inspection jobs, and no large number of workers doing the same thing in the chemical industry. This means that the tests which proved valuable in other industries for these types of jobs will have little use in the chemical industry. Because of this, the psychologist can probably do more to improve selection by the development of job knowledge tests than in other ways.

Before proceeding further, it might be helpful to illustrate with sample questions from a typical job knowledge test just what this type of test is like. (See Chart I).

PRACTICABILITY STRESSED BY JOB KNOWLEDGE TESTS

A job knowledge test is not an aptitude test or a test of motor skill. It measures only the job knowledge required to do a particular job. For example, a kettle operator spends a certain number of months or perhaps years in learning the duties of his job. The only place where he can learn these duties is on the job itself. If we had no tests whatsoever, and wished to determine whether an applicant for a kettle operator's job had the required knowledge we could have a skilled kettle operator question the applicant concerning his knowledge of the tasks performed on a kettle operator's job. An experienced kettle operator could determine in a relatively short time whether our applicant really possessed the required knowledge, was bluffing, or lacked it entirely. The difficulty with this method is that it is usually uneconomical to take an experienced man off his job every time an applicant shows up. Then again, we would need to have an experienced operator to question applicants for every job in the plant.

The industrial psychologist in this situation uses the same kind of questions which the skilled operator asks the applicant, only he puts the questions down on paper, including diagrams, thus making a test to be taken by the applicant. Furthermore, he standardizes the whole pro-

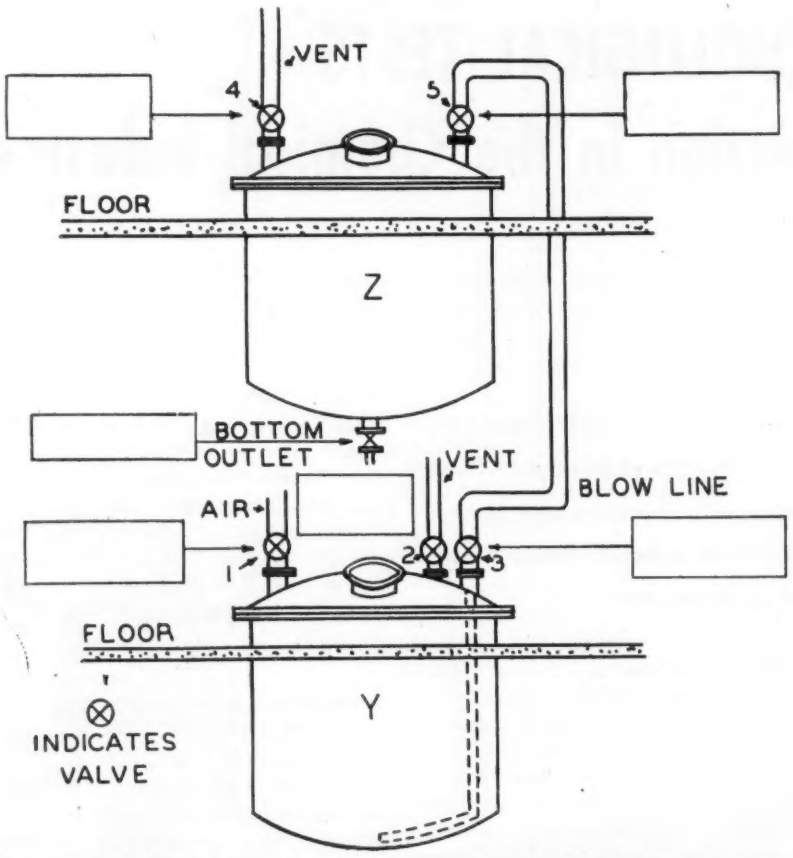
* Dr. Cook is Assistant Director of Industrial Relations at General Aniline where he has been in charge of their industrial testing program for the past two years. Before taking his present position Dr. Cook was in charge of the industrial testing for the Western Electric Co. at Kearny, N. J., for ten years.

cedure so that every applicant is treated the same way and under as nearly identical conditions as possible.

"NORMS" OR STANDARDS MUST BE ESTABLISHED

Perhaps the greatest improvement the psychologist makes over the informal questioning method is that he first sets standards of performance for the test. In that way he knows when the applicant has finished the test, not only the score but how the applicant's score compares with scores made by successful operators.

CHART



8. Contents of Kettle Y must be blown with air pressure into Kettle Z. Below are listed a number of steps some of which must be taken to do this work.

(a) Insert in the underlined space by each operation a number indicating the order in which this step must be taken, for example; Open Valve No. 0 6 Close Valve No. 0 7 If the operation is not necessary to do this job leave the box blank.

Open Valve No. 1 ___
Remove blow-leg ___
Close Manhole on Kettle Z; secure with one bolt ___
Close bottom outlet Kettle Z ___
Build up air-pressure ___
Close Valve No. 4 ___
Open vent Valve No. 4 ___
Close Vent Kettle Y Valve No. 2 ___
Open vent Kettle Y Valve No. 2 ___
Open bottom outlet ___
Close Valve No. 3 and/or Valve No. 5 ___
Open Valve No. 3 and/or Valve No. 5 ___
Close Valve No. 1 ___
Inspect Kettle Y ___
Close manhole Kettle Y; tighten all bolts ___
Open manhole Kettle Y ___

(b) Insert in the space by each valve the position (open or closed) of that valve during time material is actually being blown.

Job knowledge tests can be built around any kind of job in a chemical industry. Their chief value lies in the fact that they furnish a standard method for determining a person's qualifications for taking on new responsibilities or a new job. They also have some diagnostic value in that they point out employee's strengths and weaknesses.

The following sample questions will illustrate another type of knowledge which may be measured by means of this type of test.

1. A process requires 234 lbs. 100% of a raw material. There are two barrels of raw material to be used. The barrel tags read as follows:

Bbl.	*Gross*	*Tare*	*Net*	*%*	*100%*
1	493	58	434	43.55%	189
2	329	63	266	40.62%	108

(a) How many net pounds should be used from each barrel?

Answer: 1st barrel .....
2nd barrel .....

(b) Correct the barrel tag on the part barrel remaining:

Answer: 1st barrel .....
2nd barrel .....

CLERICAL TESTS

Thus far we have dealt with jobs in the chemical industry which require a different type of test than generally used in other industries. However, clerical jobs do not vary much from one industry to another. Therefore, clerical tests may be used successfully in almost any clerical situation regardless of the industry. These tests have standards or norms which are generally applicable and give us the facts about our applicants' clerical accuracy or speed. By the use of these norms it is possible to compare not only an individual's score, but a whole department's score with the scores made by thousands of indivduals working on similar jobs in any section of the country.

In addition to the job knowledge and clerical tests which have proven valuable there are special types of jobs where special tests are of use as, for example, laboratory technicians.

The laboratory technician has tasks to perform which require a certain amount of mechanical aptitude and proficiency with numbers; that is, arithmetic. It doesn't make a great deal of difference what else he has but he is severely handicapped if he lacks these. Tests have proven extremely valuable for selecting successful laboratory technicians.

HOW TO START THE PROGRAM?

The question now arises: How should one start such a program? First, management must be thoroughly sold on the program. If management is not wholeheartedly behind the program it is probably doomed to an early failure as it is almost impossible to secure cooperation in a program of this kind unless top management gives its active support. Second, you must secure the cooperation of the union.

Most industries are now unionized. It is only fair that union officials should be told everything concerning the program so that when questions are asked by their constituents they will have the necessary knowledge to answer the questions intelligently.

The cooperation and help of the union is especially desirable when job knowledge tests are to be used. These tests are not only helpful for selecting applicants, but they can be of great use in selecting from among a group of employees those who are qualified to handle higher grade jobs. If the union is not solidly behind a program of this kind it will naturally balk at the idea of using anything but length of service to determine qualifications for promotion. Some organizations have gotten around this difficulty by having the promotional aspects of the testing program administered jointly by the management and the union. A union has as much to gain by having qualified employees on jobs as management.

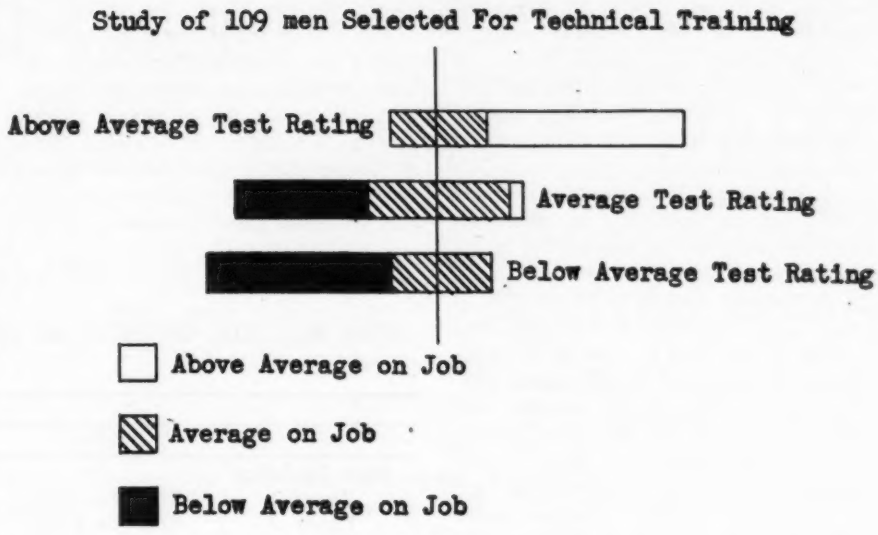
EXPERTS MUST CONSTRUCT TESTS

After the support of management and the union has been enlisted, the next thing to do is to formulate the tests themselves. Job knowledge tests must be formulated by *experts*. By experts we mean employees who are experienced and proficient on the job. It is impossible for anyone, even a psychologist, to know all of the requirements and duties of all the jobs in a plant. In order to construct a job knowledge test, for example, a kettle operator's test, the first step is to secure a group of experienced kettle operators. It might be well to add here that in this group there should be representatives of the union as well as management. These experts are then asked to write down the duties of their jobs. The psychologist now comes into the picture and performs such tasks as formulating questions around the duties, arranging them in proper order, making up multiple choice answers, etc. In other words, the psychologist takes a mass of job data and forms it into a standard test. Before being used the acceptability of this test is passed upon by both management and the union as representing job knowledge actually required.

PASSING MARK MUST BE DETERMINED

The next step is to give the test to a group of qualified operators. This latter step is necessary in order to determine just what score to expect from a qualified operator. This score may be used later as a qualifying score for that job—should it be 100%, 80% or 50%? If this step is impossible to achieve, the only other recourse is to have the group of experts, both union and management, select on an arbitrary basis, just what they consider a passing score to be. This procedure makes it possible to set fair and just requirements.

CHART II


Study of 109 men Selected For Technical Training
Above Average Test Rating
Average Test Rating
Below Average Test Rating
Above Average on Job
Average on Job
Below Average on Job

Another very important point in getting a program started is to secure qualified help. It is very risky to take any person in the plant and place him in charge of a psychological testing program. The person operating such a program should have some experience in the use and interpretation of tests. If the program does not warrant the services of a full-time person, with experience in the use of tests, at least it should be started by one of the reputable personnel consulting agencies. There are a number of such concerns in the country which are qualified to do this kind of work. Their service is well worth while and will insure a good start.

RESULTS

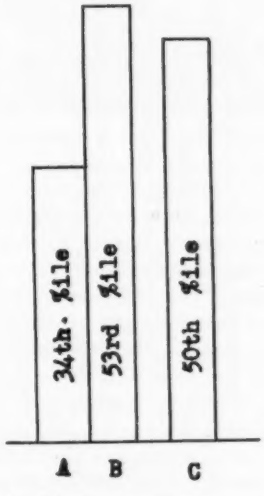
What results may be expected from a program of this kind? In the first place don't look upon a testing program as the solution to all your personnel problems, and second, don't expect perfect results. With these admonitions in mind let us look at some results which are typical. A program in which the tests are carefully given, scored and interpreted can give you results which will be from 70-85% accurate. Stated in another way, for every 10 people placed on a job, with the use of tests you can expect that 7 or 8 of them will be successful. The other 2 or 3, although passing the tests, may be unsuccessful. There are no tests which will measure a person's *will* to work. If a person is lazy or uncooperative he is just not going to do a job regardless of how well he does on the tests. All we can hope to achieve from a testing program is to improve our batting average in the number of correct or successful hirings we make.

The following charts give an indication of the effectiveness of tests for selecting applicants for various types of work.

Chart II illustrates the relationship between a battery of tests and subsequent progress in a technical training course. When men with higher test scores are selected the chances are definitely in favor of their being successful. General Aniline & Film Corporation's Central Research Laboratory has at present some 70 G. I.'s in technical training. They have been administered a battery of tests comparable to those on which the foregoing chart was based. The results of the tests are being used to group them into more homogeneous classes. This type of grouping is a great aid to more efficient instruction. In addition, special classes are formed where warranted and necessary as for example in arithmetic. There is no point in trying to teach a group of men elementary chemistry if some of them have forgotten their arithmetic.

The following chart is typical of the results which can be achieved through the use of a clerical test.

CHART III

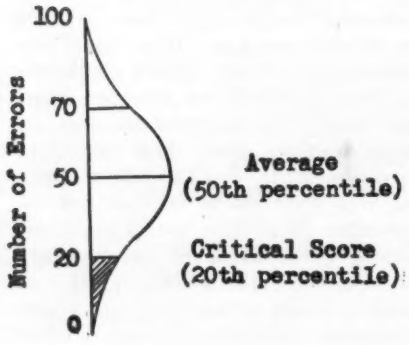


A Group Average Before Testing
B Group Average after 1 year of selection with tests
C National Average

"A" represents the low average achieved by the clerical workers in the accounting department of one Chemical industry. "C" indicates the national average of clerical workers on similar jobs and "B" shows the accounting department average after using the tests for all hiring and replacement for a period of one year. Not only is it up where it should be but, more important, the supervisors are unanimous in their praise of the high calibre of the new workers.

At General Aniline & Film's Rensselaer plant a General Classification test (Chart V) has been used for hiring laborers, yard helpers and similar starting jobs. By means of this simple, untimed, self-administered test we have been able to reduce to a minimum the number of persons hired who are so limited in their understanding of simple directions as to make their success on these jobs extremely doubtful. The following chart indicates the distribution curve for several hundred men in these lines of work, the average score and the cut-off point most useful for this type of selection.

CHART IV



This type of test not only allows us to predict the potential failures but it also indicates those who will be able to progress more rapidly in the company's service. The Industrial Relations Manager at this plant reports that this test has been a great aid in the selection procedure and the results justify continuing its use.

Summarized briefly, psychological tests can aid in the selection and placement of employees in the chemical industry just as in any other. These techniques are useful tools. They are designed neither to replace the employment manager nor to solve all of his employment problems, but rather to furnish him valuable objective data to supplement the other information he already has gathered.

CHART V

STUDY THIS CHART CAREFULLY AND ANSWER THE QUESTIONS WHICH FOLLOW

	HOURS OF WORK		
	Shift 2	Shift 3	Shift 1
Main Building			
Floor 1	8:00 to 4:00	4:00 to 12:00	12:00 to 8:00
Floor 2	8:15 to 4:15	4:15 to 12:15	12:15 to 8:15
Floor 3	8:30 to 4:30	4:30 to 12:30	12:30 to 8:30
Annex			
Floor 1	8:00 to 4:00	4:00 to 12:00	12:00 to 8:00
Floor 2	8:30 to 4:30	4:30 to 12:30	12:30 to 8:30
Floor 3	8:15 to 4:15	4:15 to 12:15	12:15 to 8:15
Powerhouse			
All floors	8:15 to 4:15	4:15 to 12:15	12:15 to 8:15

54. At what time will a worker report who is assigned to Shift 2, Annex, Floor 2? _____

55. In the Annex, how much earlier does Floor 1 leave than Floor 3? _____

56. At what time does Shift 2, Main Building Floor 3 start work? _____

57. Powerhouse, Shift 2 workers report at the same time as the Shift 2 workers on what Floor of Main Building? _____

Development of a Chemical Product

ANYONE who has participated in the development of a new chemical knows that it is an operation which involves the efforts of many persons performing many different functions. This is strikingly portrayed in the accompanying chart, which shows the process of new product development as it is carried out by the Nitrogen Division of the Solvay Process Company at Hopewell, Virginia.

The chart lists down the left hand side the various steps in the development of the product, from the original conception of the idea to full commercial scale production. Across the top are the participating functional groups and departments. The field squares then indicate at what points each group participates in the procedure and to what extent as well as who carries the principal responsibility. In actual practice the lines may not be as sharply drawn as they are here.

Stage of Development	Research	Engineering	Patent Division	Survey Group	Product Development	Construction	Production
Literature search	In charge		State of art search				
Exploratory and bench scale	In charge	Follow	Patentability study	Information summary	Market studies	Cost studies	
Intermediate scale	In charge	Follow closely	Patent Applications				
Design of pilot plant	Advise	In charge	Preliminary opinion	Preliminary survey	Preliminary evaluation	Preliminary cost estimate	
Construction of pilot plant	Advise	Assist and advise				In charge	
Operation of pilot plant	In charge	Advise			Distribute samples		
Design of commercial plant	Advise	In charge	Final study	Survey	Market evaluation	Cost estimate	Follow
Construction of commercial plant	Advise	Assist and advise			Market program	In charge	Follow closely
Operation of commercial plant	Advise	Assist and advise			Assist and advise sales	Assist and advise	In charge

A New CHEMICAL COATING To Protect METALS

EDITORIAL STAFF REPORT

ATTACKING YOUR AUTOMOBILE, AS WELL AS the nation's mightiest steel bridges, atmospheric corrosion exacts a billion dollar toll annually. However the recent development of a unique polyvinylbutyral resin-phosphoric acid wash primer is a step toward reduction of such losses.

STILL classed as in the "experimental" stage, but holding considerable commercial promise, is a unique "wash primer" developed by the Bakelite Corporation. Held under secrecy orders until recently, this polyvinylbutyral resin-alcohol-phosphoric acid compound possesses several noteworthy characteristics and marks a significant advance toward the solution of a problem which has concerned paintmakers for years—how to make protective coatings adhere more tenaciously and more permanently to metal surfaces.

In composition the wash primer is quite simple, for it is essentially an alcohol solution of polyvinylbutyral resin in which 30-50 per cent by weight of phosphoric acid (based on the resin content) is incorporated. It is easily and rapidly applied at ordinary temperatures, yet the results it achieves are remarkable. According to the manufacturer, it yields metal-primer bonds stronger and more durable than have been obtained by any comparable technique.

HOW IT WAS DEVELOPED

Development of the resin-phosphoric wash primer is a direct outgrowth of the Allies' wartime shipping plight. For although the need for better, more adherent, and more durable coatings for ship bottoms had been recognized for years, the problem was brought into sharp focus by wartime exigencies. Every boat in drydock to be scraped or painted weakened our position. Anything that could be done to prolong the life of a bottom's protective coating represented real progress.

The Navy conducted a great deal of research in this field and several eminently satisfactory anti-fouling paints were evolved. But it became increasingly evident that better primer adhesion was the fundamental requirement. Some were fairly good but there was much room for improvement, for regardless of the quality of any anti-fouling paint it was useless unless it clung firmly to the hull. And too frequently extreme cases of chipping, peeling, scaling, and consequent corrosion were recorded.

So, in the course of their investigations, Navy scientists contacted Bakelite Corp. and a research project was initiated at the company's Bloomfield, N. J. laboratories under the direction of V. H. Turkington and L. R. Whiting. From these studies came the novel PVB "wash primer."

WHAT IT WILL DO

The PBV primer utilizes both the physical properties of polyvinylbutyral and the chemical characteristics of phosphoric acid. The resin itself is tough and adherent (it is the resin most widely used as the bonding layer in sandwich type automobile safety glass) and the phosphoric reacts with the steel surface to form a thin, rust-inhibiting film of iron phosphates.

Of course, the use of phosphoric acid, as such, for the preparation of metal surfaces prior to the application of primer coats is not new. But its major field of application has been in the hot dip tank treatment of small metal parts—such as automobile fenders. Too, some phosphoric acid washes have been used in the field for swabbing steel plates prior to painting, but the results have not been uniformly satisfactory. The PVB composition provides a somewhat more viscous material, contributing to more thorough application, and is claimed to produce a more uniform, finely crystalline phosphatic skin.

Another important attribute of the PVB primer is that it virtually eliminates corrosion creeping. Hitherto this has been one of the main problems. A slight break —even a pinhole—in the paint film, and rust not only attacks the exposed spot but also creeps under the paint to cause extensive scaling. Hot phosphoric type treatments, kindred to Bonderizing, have value in this respect; cold washes have not demonstrated particular worth.

The PVB wash is relatively inexpensive and is applied in a very thin film—not over ½ mil in thickness. It can be sprayed or brushed on and dries to a hard coating in a matter of minutes. It adheres well to ordinary steel, stainless steel, aluminum, or galvanized metal. It has some anti-corrosion properties, but is not designed to be a complete primer. Rather it is a foundation for standard primers, such as red lead and linseed oil, alkyd or oleoresinous compositions, which are applied in the usual 5-6 mil thickness over the PVB-prepared metal.

FUTURE POSSIBILITIES

Obviously the greatest field of promise for the PVB wash lies in the treatment of tankers, pipelines, trains, exposed structural steel members, or wherever it is necessary or desirable to paint metals. Conceivably it could find a place in manufacturing processes—in the automobile industry, for instances—to compete with dip tank methods, but the economics of this market have not been fully investigated.

At present this novel wash primer is being produced in experimental quantities only. No marketing plans have been established and Bakelite is confining its activities to supplying small lots to cooperating consumers and paint manufacturers.

Nevertheless one fact seems evident. Much more will be heard of this unique product in the next few years.

Official U. S. Navy Photo

Ships provide a tough proving ground for anti-corrosion coatings. A prime requisite is that all metal surfaces must be properly prepared and then protected with durable primer coat.

No. 3 of a series on
MODERN METHODS AND MATERIALS FOR ADHESIVES MANUFACTURE

SYNTHETIC RESIN ADHESIVES

Do Many Jobs Better and Cheaper

by ALEXANDER FRIEDEN
Director of Research, Pabst Brewing Co.
Milwaukee, Wis.

RAPID ADVANCES IN SYNTHETIC RESIN ADHESIVES are making all industry more adhesive conscious. Their growing durability and economy pace the trend toward their use in many applications formerly employing mechanical fastenings. Synthetic adhesive producers who have built the business to its present total of $25 million per year are now able to supply products tailor-made for almost any desired purpose.

USING resins as adhesives accompanied the general development of resins from the very beginning. It was one of the properties examined by the organic chemist in his evaluation of the products he created. Unfortunately, the technical staffs of the chemical companies were not familiar with the problems and mechanisms of adhesion, and the adhesive companies lacked the technical knowledge to "catch on" and benefit from the findings of an allied field. Consequently, there was a considerable lag in applications, and, with the exception of a few alert organizations, little was done until the past ten years or so.

The use of synthetic resin adhesives has made possible operations which had been beyond the reach of regular adhesives. It has also made it possible to improve technically and economically many adhesive operations heretofore done with the older adhesives. Synthetic resin adhesives have a field of usefulness of their own where water resistance is required, special surfaces are to be glued, and where special conditions are to be met. In addition, they have displaced, and will continue to displace, older types of adhesives as these resins become cheaper and the knowledge of their properties more extensive.

Synthetic resins produce high strength bonds with glass making it resistant to shattering.

HOW THEY ARE MADE

In discussing the use of synthetic resins for adhesives in a short summary such as this, only the most fundamental points can be touched on. Most important of all is to remember that these synthetics are prepared from simple molecules or monomers and that these molecules grow in size progressively, depending on the conditions of the reaction. As the growth proceeds the product may pass from a thin liquid, or even gaseous phase, through the stages of syrup, gel, soft solid, and hard solid. Since the growth can be stopped and arrested at any point, it is possible to produce numerous variations.

Molecular growth may be accomplished in several well known types of reaction: namely, polymerization, condensation, cross linking, and copolymerization, or in a combination of two or more of the above types. *Polymerization* is the process by which like molecules combine with one another to form larger units. Thus, polythene is a polymer of the ethylene molecule. *Condensation* is the reaction of two different types of molecules. Thus, in the formation of urea formaldehyde resins, urea and formaldehyde condense to form methylol urea or dimethylol urea, which then act as monomers to polymerize to polymers of varying degree of polymerization.* Typical resins formed by means of *cross linking* are the maleic acid-glyptal condensations, or resins in which ethylene oxide or other reactive molecules are used as cross linking agents to build up three-dimensional polymers. The simultaneous polymerization of two or more types of monomers produces co-polymerized materials. Chief among these are vinyl chloride-vinyl acetate copolymers. It is interesting to note that copolymerization is possible with monomers that will not polymerize singly. A classic example of such a reaction is the maleic anhydride—stilbene copolymerization.

Another important basic property to keep in mind when discussing the use of synthetic resins for adhesive purposes is their behaviour toward heat. In this respect they react in two ways—either they are thermoplastic or they are thermosetting. The thermoplastic resins are, as the name indicates, heat sensitive with respect to viscosity and plasticity. They are fusible and reversible. Most of the synthetic resins fall into this class. They will be of increasing interest to the adhesive user as the development of heat sensitive adhesives grows. The thermosetting resins are those that are converted by heat into an infusible mass. Urea formaldehyde, phenol formaldehyde, and the furfural resins are the outstanding members of this class. Generally, it is considered that the determining factor in a resin's being thermoplastic or thermosetting is principally the type of bond by which the polymer is formed. Where a large number of secondary valence forces are operative in building the polymer, the resin is apt to be thermoplastic; where the forces are primary, such as in condensations, the usual type is thermosetting. It has been possible to change a thermoplastic resin into a thermosetting type by means of cross linking.

* Hereafter referred to as D. P.

The form in which the resin is available for application by the user is of extreme importance. For the majority of applications the desirable type is one that is water soluble, since it lends itself to a wider range of uses and is also apt to be the most economical. Chief among this type of resin are the urea formaldehydes, melamine formaldehydes, polyvinyl alchohol, and the simple celluloses—such as methocel and carboxymethocel. Next in preference are the water dispersions. These dispersions generally use no other solvent than water and can be prepared in high solids concentration. The outstanding members of this class are the vinyl chloride—vinyl acetate copolymers, the acrylates, and the synthetic rubber latices. Emulsions have recently come into wide use. As compared with dispersions, it isn't always possible to prepare them in as high solids concentration. Also, where water resistance is an important consideration the emulsifying agent used must be selected carefully. The emulsion should break on drying and not be reemulsified on exposure to moisture. However, a great deal of knowledge has been gained on the preparation of emulsions. It has been found possible to vary the solid content within wide limits, and the recent technique of polymerizing monomers in the emulsion form should open up new possibilities. Undoubtedly, the use of emulsions will continue to expand.

Dry powdered resins are used for "hot melt" operations, where the resin is softened or rendered fluid by means of heat and is solidified when the temperature is reduced.

The use of organic solvents for synthetic resins is widespread in the preparation and compounding of adhesives for numerous special uses.

The following is a short resume of the resins most frequently used as adhesives and the type of operations in which they are favored.

UREA-MELAMINE RESINS

This class of resin consists of urea formaldehyde, melamine formaldehyde, and various combinations of the above with modifying agents. They are of the thermosetting variety. Generally the resins are partially polymerized by the manufacturer to the stage where they are still peptized in water. (Solvent soluble urea resins are also manufactured, but most of the resins made are of the water dispersible type.) The polymerization is completed after application by the consumer through the use of catalysts, heat, or both. One of the important characteristics of these resins is their property of compound formation with starch, thus blocking off free hydroxyl ions and reducing the degree of water imbibition of the starch product. Large quantities of urea resins are used in combination with flours and starches. It should be emphasized that the urea resins are not waterproof but only water resistant. In the presence of moisture, the urea resins will absorb considerable amounts, but the adhesive film will tend to swell rather than to disintegrate. The strength of the bond is, of course, greatly reduced. By far the largest amount of urea resins is used in the woodworking industry for veneer, plywood, panels, and parts where high water resistance is not essential. In most cases they are used along with flour or starch to reduce the adhesive cost. A urea or melamine resin may come to the user as a syrup containing from 50% to 70% resin, or as a powder, such as dimethylol urea. The resins are mixed with water, a catalyst—such as alum, ammonium chloride, etc.—is added to adjust the mix to the proper pH, and, after the adhesive operation is completed, complete polymerization is effected with or without heat and pressure.

Recently, large amounts of water dispersions of urea formaldehyde—starch combinations have been widely used as adhesives in the manufacture of water resistant laminated and corrugated board subsequently made into shipping cases. They have also been used as water resistant adhesives for bag work, for tube winding, and as the adhesive for closures —such as the flaps of corrugated boxes. The surfaces on which the urea resins are most widely used as adhesives are wood and paper. The precautions to take in using these adhesives with starches and flours are the adjustment of pH and the heat factor. The lower the pH, the quicker the resin will polymerize and the shorter will be the life of the glue. A pH of around 5-½ is to be preferred where possible and, with the proper adjustment, a starch-urea glue will retain its gluing characteristics for about twelve to eighteen hours. The temperature, of course, also affects the rate of polymerization of these glues.

PHENOLICS

The base of all of these resins is phenol or a derivative of phenol, such as resorcinol. They are condensed with aldehydes or ketones—chiefly formaldehyde, furfural, or acetone. These resins are thermosetting and need catalysts and curing for complete polymerization. The curing is generally done under pressure. In some formulations where resorcinol is used, curing at low temperatures—even as low as room temperature—is possible. For adhesive purposes, the chief use of these phenolics is for wood gluing in the manufacture of veneers, plywood, and panels where high water resistance is required.

"Tailoring" of the adhesive to fit a specific use has become common practice in the scientific formulation of synthetics. Pilot plant batches are useful in testing trial compositions.

VINYLS

This is a large and important class of compounds, which has been adapted for a great variety of adhesive purposes. The class contains water soluble and water insoluble members, polymers, copolymers, emulsions, and dispersions.

Polyvinyl alcohol polymers are water dispersible and can be prepared in several viscosities, depending on the D.P. of the polyvinyl acetate, from which the alcohol is made by hydrolysis. It can be used alone and in combination with starch products, caseins, rubbers, and other vinyl compounds—to form new types of adhe-

sives as well as improved adhesives to replace the older types. Polyvinyl alcohol adhesives can be made water resistant by heavy metals, but the best method is through the use of urea formaldehyde resins. A combination of polyvinyl alcohol and urea formaldehyde is now being used successfully for laminating in the manufacture of water resistant solid fibreboard. Polyvinyl alcohol films are tough and resistant to oil as well as organic solvents. They are particularly desirable as adhesives for closures on food containers.

Polyvinyl acetate resins are available dry, as solutions in organic solvents, or as emulsions. The latter is the most favored type, since it is more flexible in operation, is non-inflammable, and can be diluted with water. Polyvinyl acetate films are water resistant, though their water resistance is not of a high order. Many adhesives can be prepared by the use of combinations of polyvinyl alcohol and polyvinyl acetate along with other modifying agents. Their widest use has been in the leather field for sock linings, for heel building and other operations in the manufacture of shoes, as well as a water resistant glue for paper products, such as for cigarette cups, drinking cups, laminates, bookbinding, etc. They show good possibilities for heat sealing bonds.

A number of other vinyl polymers and copolymers are used in solvent, dispersion, or emulsion form for many adhesive purposes. Thus, polyvinyl butyral is particularly adaptable for glass laminations; vinyledene chloride polymer is an excellent adhesive for plastic surfaces; vinyl chloride polymer, for rubber surfaces and where high water resistance is required for wood panel work.

CELLULOSE COMPOUNDS

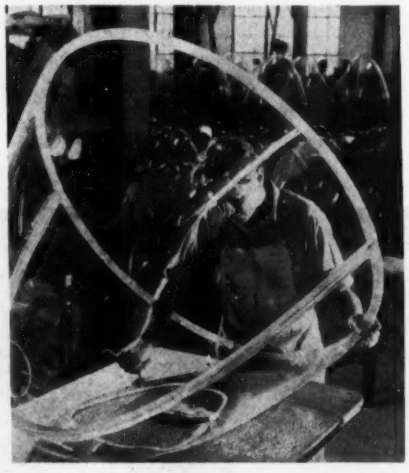
The modified celluloses also constitute a large class of compounds adaptable for adhesive purposes. Of particular interest are cellulose nitrate, cellulose acetate, cellulose butyrate, and ethyl cellulose for solvent soluble adhesives; and methyl cellulose and carboxy methyl cellulose for aqueous adhesives. It should be borne in mind that the cellulose compounds can be made in a large number of varying viscosities, depending on the degree of degradation to which the cellulose molecule has been subjected before using it in reactions.

The celluloses are thermoplastic. Organic solutions of the solvent soluble celluloses are used for bonding glass, for laminating textiles to paper, and—where the cost justifies it—for paper to paper bonds. This type of adhesive should be particularly adaptable for heat sealing, with the exception of the nitrate, which may be too inflammable. A large number of special adhesives are made from cellulose bases compounded with other products, such as alkyds, acrylates, hydrocarbon polymers, allyls, etc.

The water soluble cellulose modifications are not used to any appreciable extent for adhesive purposes. There are a few special uses. Thus, methocel solutions are used as an adhesive by tanners to paste skins to frames; as a core binder for special core work in foundries; as a glue for tobacco leaves, etc.

OTHER SYNTHETICS AND RUBBERS

The number of variations possible in formulating adhesives from resins is so great that a detailed discussion of them is impossible in this short summary. Suffice it to say that alkyds have been used particularly for laminating and as ingredients in the compounding of other adhesives, such as pressure sensitive tapes. Acrylates and methacrylates have been used for combining paper surfaces, plastic surfaces, rubber and metal, and for other laminations. The chief advantage of the acrylates is the elasticity of their films. Allyls have been used for laminations. There is a broad series of hydrocarbon polymers—composed of such products as indene, coumarone, styrene polymers, polyterpene polymers—which are used in particular with rubbers, synthetic and natural, as elastomers and tackifying agents. A group of adhesives recently developed for metal bonding consists of resins that have good adhesive properties and an elastomer, such as a styrene polymer, to minimize the stresses and strains resulting from differences in expansion. Silicone resins have been used for specialized adhesive purposes, such as for mica laminations.



Formed halves of airplane noses are cemented together with an acrylic resin adhesive.

Closely allied to the synthetic resins are the synthetic rubbers. Latex cements and rubber solutions (in organic solvents) have long been used as adhesives, particularly by shoe manufacturers. During the war substitutes had to be found for those uses which were not regarded as highly critical from a military point of view. Synthetic rubbers and latices met these needs as well as—and in some cases better than—the natural rubber. Of importance in adhesive formulations are, principally—the GRA type, which is a copolymer of butadiene and acrylonitrile; the GRS type, which is a copolymer of butadiene and styrene; and the GRM type, which is a polymer of chloroprene. These latices, along with resins, make up a wide variety of adhesives. Useful adhesives have been made from them as well as from isobutane polymers by compounding them with resins, rosins such as the Dresinate made by Hercules, with casein solutions, starch dispersions, etc. These adhesives have been used for a great variety of purposes, such as paper bags, pressure sensitive tapes, closures, case and carton sealing, leather, and metal surfaces.

OTHER ADHESIVE MATERIALS

This article discussing synthetic resin adhesives and the two previous papers on starch and protein materials cover the major types of industrial adhesives. There are, however, a number of other products —natural gums, silicate, asphalts, waxes and lignins — which occupy important places in the adhesive field.

Gum arabic finds application for special envelope seals, cigarette paper seams, and certain pharmaceutical preparations. Rosin and shellac are used in laminating, molding and for some sealing purposes.

Sodium silicate is widely used in the manufacture of corrugated board, for sealing paper board cases, and for laminating and tube winding. Asphalts find important uses in paper board, bags and textile-paper combinations where their low cost, flexibility and moisture resistance are advantages. Asphalts are also finding new uses in combination with other adhesives.

Waxes are used in laminations to develop water vapor barrier properties. In combination with rosin, waxes have the advantage of quick adhesion for such uses as metal can labeling. Lignin is employed in adhesives for cementing linoleum.

While the use of gumming materials is one of man's oldest arts in the fabrication of his goods, it is only recently that the formulation and use of adhesives has become a science. With the advent of the scientific approach the pace of progress has quickened and techniques have been developed for tailoring adhesives to a great variety of uses.

REPRINTS AVAILABLE

A booklet containing Dr. Frieden's three articles on adhesives—including Starch, Protein, and Synthetic Resin products—is being prepared. Orders will be filled as long as the supply lasts, on the basis of 50 cents per copy.

New Spray Dryer Pilot Plant

WITH SPRAY DRYERS the "proof of the pudding is in the eating." Thus it is important to chemical manufacturers to have at their disposal such experimental units as this new Swenson pilot plant.

SPRAY dryers have long been used on a variety of products—milk, glue, gelatin, blood, albumin, starch, soap, latex, alum, insecticides—because of the unique properties they impart to the product and because of the process simplifications they embody. The specification of this type of dryer often requires experimental testing on a fairly large scale for both product evaluation and plant equipment design.

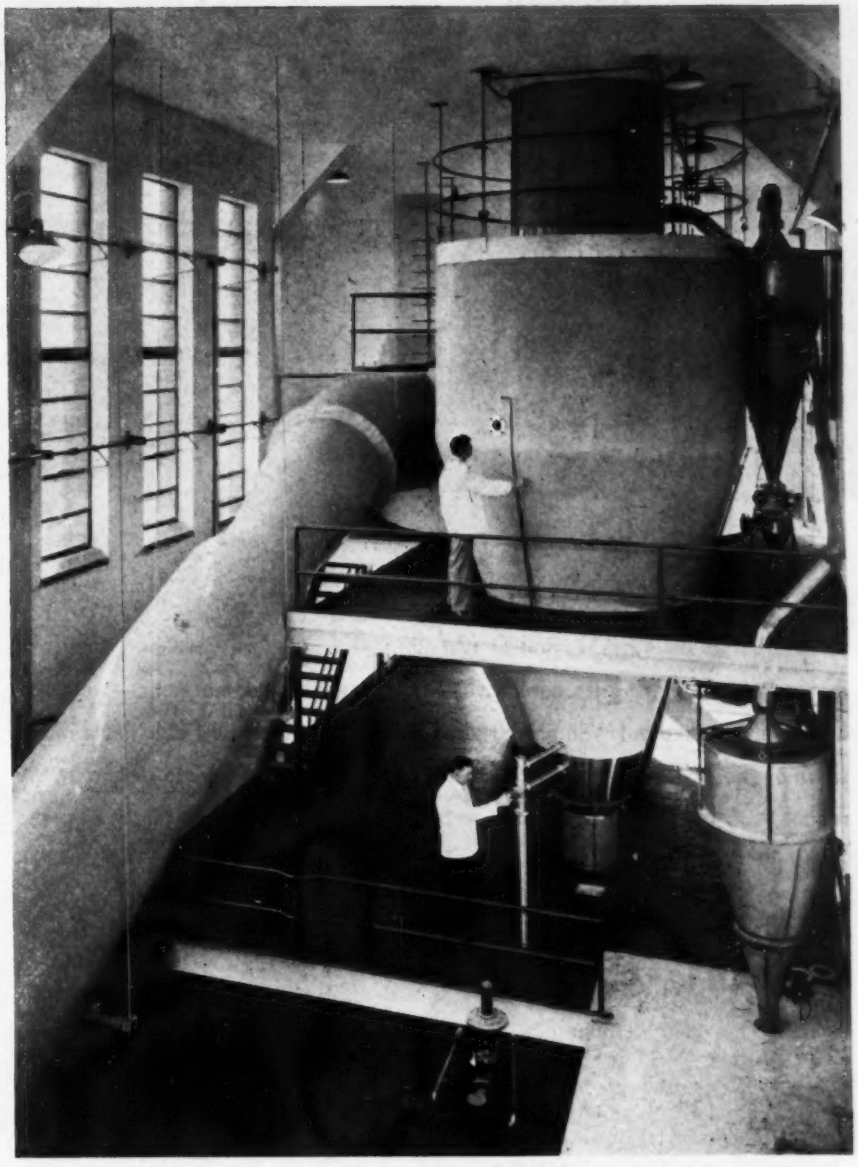
Leading fabricators of spray drying equipment, recognizing the need for test equipment, have made available to the chemical industry a number of experimental units. The most recent is the new research spray dryer of the Swenson Evaporator Company at Harvey, Ill., which has a complete system built around a drying chamber 14 feet in diameter. Three other firms also have test equipment ranging from laboratory units of 2.5 and 4.0 feet diameter, to commercial tests dryers 18 and 20 feet in diameter.

The smaller spray dryers have proven of considerable value in preliminary testing, and for certain products that may even give design data. But, where granular product particles are desired large diameter drying chambers must be used.

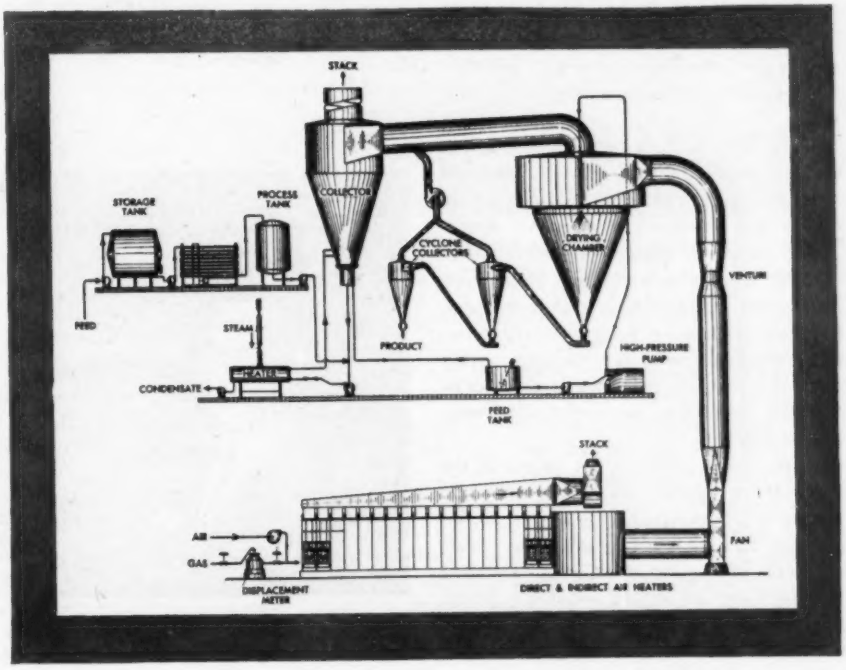
The particles produced in spray dryers are usually uniform and round; they may be spongy, or even hollow; they have a rather low bulk density, dissolve rapidly and tend to be free-flowing and non-caking.

Process-wise the spray dryer combines in one operation evaporation, filtration, drying and grinding. Feeds varying from filter-press cake of 65% solids to thin slurries or solutions of 5% solids are reduced to dry powders in a single step.

The process industries benefit from these experimental spray dryers, for large scale equipment is expensive, particularly for preliminary tests. The new Swenson pilot plant adds to those already available at Bowen Engineering, Inc., Western Precipitation Corp., and the Instant Drying Corp.



Above is the interior of the Swenson Evaporator Company's new spray dryer research unit at Harvey, Ill. The 14-ft. diameter drying chamber is behind the collector in the foreground. Below is a flow-sheet of the entire unit showing all the component parts.



FLUORINE CHEMISTRY

Achieves Commercial Stature

EDITORIAL STAFF REPORT

FLUORINE AND ITS COMPOUNDS were intensively studied during the war years. Large-scale production of the elemental gas was made practical, and methods for preparing its derivatives—both organic and inorganic—were exhaustively worked out. So potentially important is this new field that a major share of the Division of Industrial and Engineering Chemistry's program at the recent ACS meeting was devoted to a symposium on fluorine chemistry, the highlights of which are reviewed here. A new industry is well on the way.

IN ONE SENSE, fluorine chemistry can hardly be called new. Most of its inorganic compounds have been known for years, and many of them—notably fluorspar, cryolite, the fluosilicates, sodium fluoride, hydrogen fluoride and boron trifluoride—are commercially important. The latter two have become especially prominent of late as catalysts in organic reactions, the most extensive of which is the HF alkylation process in the conversion of petroleum products.

Even the element itself has been known for 60 years—since Moissan succeeded, in 1886, after more than 75 years of labor on the part of many workers, in isolating the pungent, corrosive, greenish-yellow gas.

In the organic field, simple fluorine-containing compounds have been used for more than a decade as refrigerants, known under the familiar trade-name Freon. These found still another application during the war as solvents and dispersants for aerosol insecticides. Aside from these, however—except for some aromatic fluorine compounds used in Germany as insecticides and dye intermediates—organic fluorine compounds were virtually unexplored territory.

What is new, then, is the extent of the work being carried on. Fluorine is no longer a laboratory curiosity but an industrial fact. Fluorine technology deals not with grams but with tons. Fluorine reactions are no longer a baker's dozen, but a whole new chapter in organic chemistry.

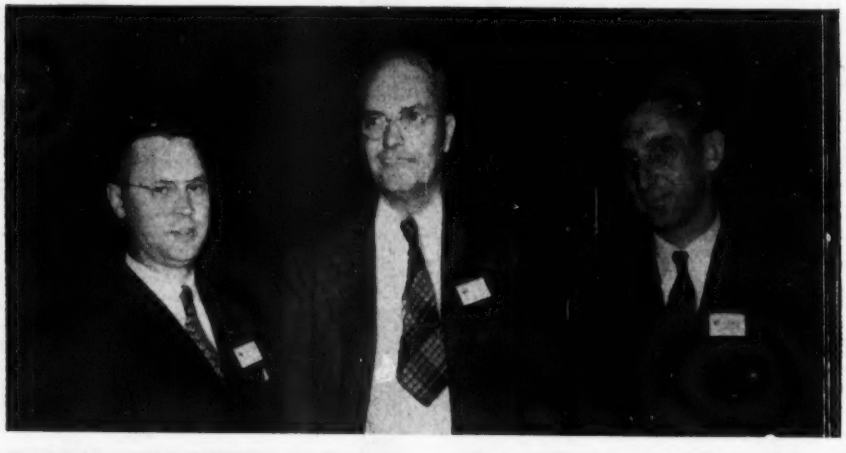
ELEMENTAL FLUORINE

Although fluorine is the seventeenth most plentiful element in the earth's crust (ranking below chlorine but above bromine) and was isolated more than half a century ago, relatively little work was done with it until the beginning of World War II.

A good part of this is readily understood when one considers the characteristics of fluorine. In pure form it is a pale, almost colorless gas which liquefies at about the same temperature as air, and is the most chemically reactive of all the known elements. It is so active that solid fluorine and liquid hydrogen explode upon contact at temperatures as low as –252°C. The free gas, at room temperature, causes massive chunks of wood to burst into flame and will cause steel wool to burn.

As a consequence of the vigor of the reaction when fluorine combines with other elements, the resulting product is generally very stable. Naturally-occurring fluorine compounds such as fluorspar and cryolite are relatively inert, and a reversal of the spontaneous, energy-liberating reactions forming such compounds is necessary in order to win the free gas. This can only be accomplished by electrolysis in special equipment.

In 1942 production of fluorine by existing electrolytic processes was only a possible few pounds a day; three years later production was measured in tons a day. The atomic bomb program, which utilized quantities of uranium hexafluoride, was responsible for much of the spectacular boost. Fluorine research, moreover, spurred by the NDRC and the OSRD, was undertaken by many industrial and university laboratories. The result is fluorine available in relatively large amounts at less than a tenth of its



Fluorine Symposium Chairman E. T. McBee, of Purdue University, chats with authors of papers, L. A. Bigelow and R. G. Sweet, of Duke and Johns Hopkins universities respectively.

former cost, accompanied by a considerably widened knowledge of its usefulness.

PRODUCTION

The electrolytic generation of fluorine is possible under varying conditions of temperature and electrolyte composition, although different temperatures or different compositions often require different materials of cell construction.

One commercially practical cell[1] of the diaphragm type draws approximately 1000 amperes. Ordinary carbon steel is suitable for the major parts of this cell, including the cell body, the hot water jacket, the HF feed line, the cathode, and the solid part of the diaphragm. The anodes are carbon rods impregnated with copper and the diaphragm is a Monel screen. The electrolyte is fused KF · 2HF with 1.0 to 1.5 per cent LiF added. The cell operates at 95° to 115°C. with an anode current efficiency close to 95 per cent and an overall potential drop of 9.0 volts. Such large cells have operated continuously with little attention for over 13 months.

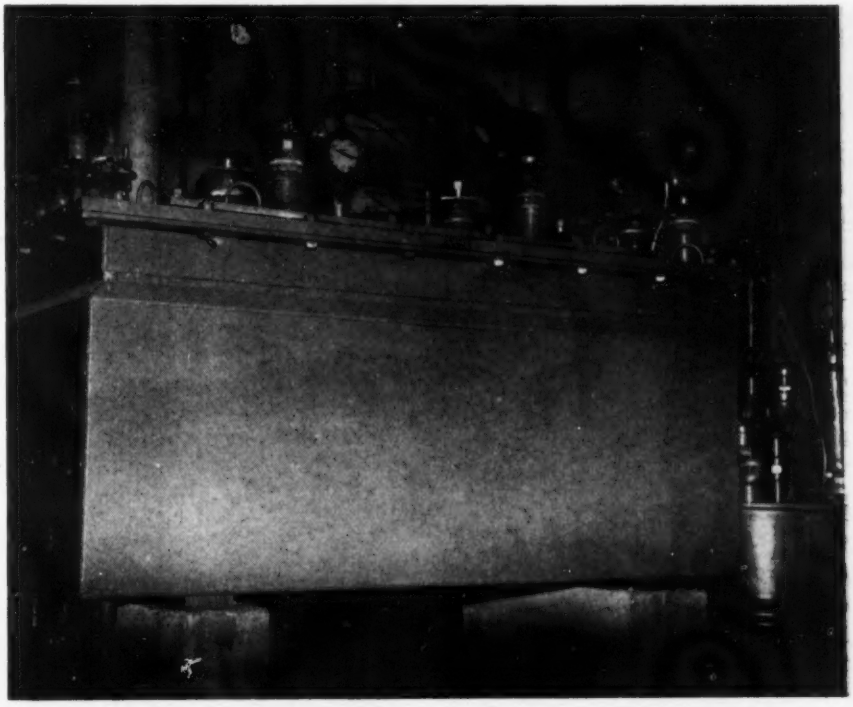
A similar cell,[2] except that the anodes were of nickel, was developed by another group. Difficulties with carbon anodes led to the use of nickel, which is satisfactory even though its corrosion rate is high and the corrosion products tend to contaminate the electrolyte. Its advantages are high mechanical strength, insensitivity to impurities such as water, and resistance to polarization. Carbon anodes, in addition to breaking more easily, have a tendency to polarize in both dry electrolyte and that containing traces of water. These difficulties are substantially overcome by including 0.5 per cent LiF in the electrolyte and, most important, by operating at low current density. Short-time electrolysis with auxiliary nickel anodes is also effective for the removal of traces of water in the presence of which carbon anodes will not operate. Under proper conditions of HF concentration, temperature and low current density, and no water in the electrolyte, there is no polarization.

The final type of cell developed employs carbon anodes. It is capable of operating more than 5,000,000 ampere-hours with current efficiencies above 90 per cent and power efficiencies of about 30 per cent. Cheap fluorine production requires the use of carbon anodes because of the cost of the nickel consumed and the corresponding lowering of ampere efficiency.

A larger carbon-anode cell[3] operates at 2000 amperes. Design was based on alkali-chlorine cell practice with multiple parallel electrodes active on both sides to conserve space at low current density and voltage, quick renewal of standardized electrode and diaphragm unit assemblies with the cell in place, and a minimum of inlets and outlets to avoid leakage of dangerous chemicals. The problem of carbon-to-metal contacts was solved to the extent that anodes last 3 months. Corrosion of the diaphragm screens was arrested so that a life of about a year is indicated, and the cathode and cell body appear to be good for several years. Correct control of the HF and temperature was found to be essential.

Several hundred cells of this general design were operated at about 90 per cent current efficiency, 8 to 10 volts, and producing 99 per cent fluorine after removal of 4 to 8 per cent HF.

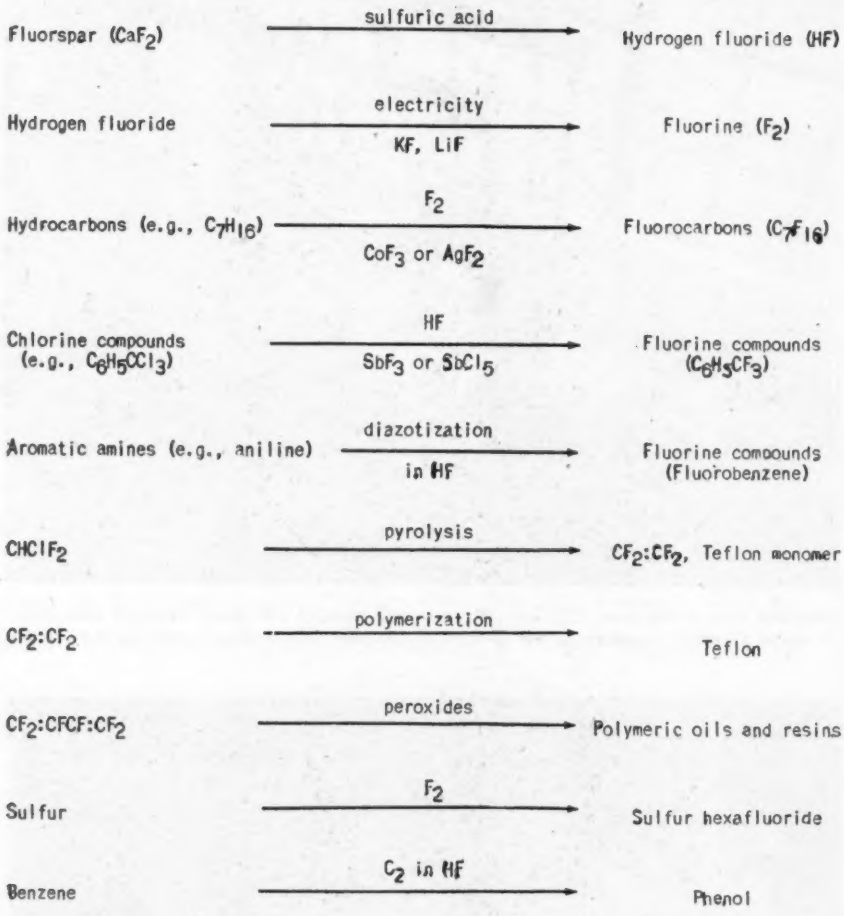
Overhead view of Harshaw 1500-ampere commercial fluorine cell shows electrical connections to motor-generator assembly, anode current distributing ring, hydrogen and fluorine outlets.



2000-ampere Hooker Electrochemical Company carbon anode fluorine cell.

Some general observations have been made on the generation of fluorine by electrolysis. Molten KHF_2 can be used as the electrolyte,[4] but the operating temperature is necessarily higher in order to keep the salt molten (about 250°C.). Regeneration of the electrolyte is accomplished by the batchwise introduction of gaseous HF through inlets provided for the purpose. The life of the cell is about 200,000 ampere-hours, compared with 13,500,000 ampere-hours for some of those designed to operate at about 100° C.

IMPORTANT FLUORINE REACTIONS



The inclusion of small quantities of lithium fluoride in the KF-HF melt not only reduces polarization at the electrodes but also helps maintain fluidity of the bath at lower temperatures or reduced HF content.[5]

Comparative experiments demonstrated the desirability of providing for circulation of the electrolyte vertically around the cathode, resulting in cooler operating temperatures and larger possible current densities without polarization difficulties.

HANDLING AND STORAGE

Fluorine gas can be handled satisfactorily at ordinary temperatures and atmospheric pressure in piping, tubing and other vessels constructed of copper, steel, nickel and Monel.[6] Corrosion data indicate that aluminum and magnesium resist attack well, but that few other materials except metal fluorides in their highest valence state are nonreactive with fluorine.[7] The principal precaution necessary in handling the gas is assurance that the equipment is free from water or organic material such as residual grease and pipe dopes. Nickel and Monel are the most satisfactory for valves. The only satisfactory packing material found[6] is a compressed and sintered mixture of a heavy metal fluoride—e.g., calcium fluoride—and Teflon (polytetrafluoroethylene).

Storage of fluorine gas under pressure can be accomplished either by mechanical compression or by evaporation of liquid fluorine into a closed vessel. The latter is effected by the condensation of purified effluent fluorine by means of liquid nitrogen and expansion into copper, nickel or steel cylinders. Pressure up to 400 p.s.i. have been safely achieved in this manner.[8,9] The expensive liquefication procedure can be replaced by the more economical mechanical compression provided that the lubricant used is a perfluorinated hydrocarbon of suitable viscosity. Pressures as high as 175 p.s.i. have been obtained using a standard gas compressor.[9] Another system[10] employs a standard, commercial, oil-operated diaphragm pump arranged to transmit pulsations, hydraulically, to a second diaphragm pumping head in contact with the fluorine. The two pumping heads are connected by a pipe passing through a fire wall and containing a highly fluorinated hydrocarbon inert to fluorine. The product is delivered into storage tanks at 30 pounds pressure by this system.

ANALYSIS, DISPOSAL

Electrolytic fluorine, as generally produced, contains appreciable quantities of HF together with smaller amounts of oxygen, CF_4, CO_2 and inert gas, usually nitrogen. The removal of HF has been satisfactorily accomplished[9] by passing the gas through condensers at dry ice temperatures. The same principle has been applied successfully at other temperatures up to several hundred pounds pressure. The gas cooled to —70° C. and 1 atmosphere contains 4 per cent HF by volume which can be readily removed by passing the gas through a bed of NaF pellets. At ordinary temperatures NaF tends to absorb more than one mole of HF, resulting in the formation of a semi-fluid polyacid fluoride. The formation of these salts can be prevented by operating the absorbers at 100° C., at which temperature the HF content of the effluent fluorine, according to the vapor pressure curve of $NaHF_2$, is 0.18 per cent. The quality of the fluorine can be determined[6] by passage of the sample, first through dry NaF pellets to absorb the HF, and then through dry NaCl which converts the fluorine to chlorine. The resultant gas mixture is analyzed by standard methods for chlorine. Direct analysis for HF is made by determining HF absorbed by the sodium fluoride.

For disposal, fluorine can be converted in various ways to less active compounds.[6] The gas will react quantitatively with activated carbon, sulfur, and with most hydrocarbons to give the corresponding products CF_4, SF_6 and HF. Reaction with sulfur is not considered satisfactory because of the hazardous by-products formed, but the reaction with hydrocarbon gases followed by water or alkaline scrubbing is satisfactory for the destruction of large quantities of fluorine. The gas will also react with water or steam, but occasionally the reaction is inhibited with the result that the hazard is only partly eliminated.

FLUOROCARBONS

The term "fluorocarbons" is sometimes used loosely for any fluorinated hydrocarbon, but it refers properly only to those in which fluorination is complete, i.e., where all the hydrogen atoms are replaced by fluorine. The prefixes "per-" and "Φ" are often used to indicate complete substitution by fluorine; e.g., "perfluorobutane," "Φ-naphthalene."

The fluorocarbons, like the hydrocarbons from which they are derived, range from gases to solids. The boiling points of the fluorocarbons, indeed, never differ more than 32° from those of the corresponding hydrocarbons. Unlike their parent hydrocarbons, however, they can be heated to 400° to 500° C. without cracking. They are stable towards air and do not burn. If fully saturated they are not attacked by HNO_3, concentrated H_2SO_4 or oleum, or nitrating mixture, nor by acid chromate and permanganate solutions. They are also stable towards dilute and concentrated alkalies to 100° C.[11]

The stability of these compounds is due, it follows, to the stability of the C-F bond.[12] There is evidence of electrical resonance to the extent that the bond radii in carbon tetrafluoride are 0.05Å less than normal, corresponding to about 10 per cent double-bond character. The practical effect of this is demonstrated by the fact that carbon tetrafluoride reacts with sodium only at red heat. Also, benzotrifluoride, whose chlorine counterpart is easily hydrolyzed to benzoic acid, has been heated with 2N hydrochloric acid at 150° C. for fifteen days without change. Vigorous oxidation of the compound, moreover, gives trifluoroacetic acid. Hydrogenation gives trifluoromethylcyclohexane, but similar treatment of the corresponding chlorine compound breaks the C-Cl bonds to give methylcyclohexane.

The fluorocarbons, because of their extreme stability, are of interest for thousands of potential uses, such as lubrication of heavy-duty bearings where high pressures and temperatures break down normal oils and greases; as inert solvents for chemical processes and extractions; and possibly as heat-transfer media.

METAL CARRIERS

Fluorine by itself is too vigorous and uncontrollable an agent for fluorination of hydrocarbons. A less powerful, more easily controlled agent, giving better yields, is cobalt trifluoride,[13] which is prepared by treatment of cobalt chloride, $CoCl_2$, with gaseous HF at 350° to 450° C. to give CoF_2, and subsequent treatment of the CoF_2 with fluorine at 200° to 300° C. to give CoF_3. The hydrocarbon vapor diluted with nitrogen is then passed over the bed of CoF_3 at 200° to 300° C. The hydrogen is replaced by fluorine, giving the fluorocarbon and HF, and the cobalt trifluoride reverts to CoF_2. The HF is then recovered and electrolyzed to give fluorine again. A pilot plant[14] consisting of six reactors, each containing about 130 lbs. of CoF_3, has been run continuously for two years. Production was carried out on a semi-experimental basis, varying conditions such as rate of flow of feed stock, proportion of nitrogen diluent, reactor temperature, and the like, to obtain optimum conditions for maximum yield. Experimental quantities of many different fluorocarbons were produced, including several hundred pounds of *n*-perfluoroheptane, perfluorodimethylcyclohexane, and miscellaneous perfluoro oils including several thousands pounds of approximate formula $C_{21}F_{44}$. Other perfluorinated hydrocarbons experimentally produced were *n*-hexane, *n*-octane, cetane, cyclohexane, methylcyclohexane, ethylcyclopentane, and indane.

A plant[15] based on these findings employs a gas-fired, plow-agitated, horizontal tubular reactor to fluorinate *n*-heptane. The CoF_2 is fluorinated at 200° to 250° C. and the hydrocarbon is vaporized over the CoF_3 at a graded temperature of 225° to 350° C. The effluent mixture is condensed, the HF and organic material separated in the liquid phase, and the first-pass organic crude re-passed over the CoF_3 to give complete fluorination. The impurities found are of two types: (1) incompletely fluorinated heptane and heptene of formulas $C_7F_{15}H$, $C_7F_{14}H_2$, etc., and $C_7F_{13}H$; and rearrangement products, such as perfluoroethylcyclopentane, perfluoromethylcyclohexane, isomeric perfluoroheptanes, and low-boiling fluorocarbons. Essentially the same procedure has been employed[16] to fluorinate bis-(trifluoromethyl)-benzene to perfluorodimethylcyclohexane, and lubricating oil.[17]

Other metal fluorides have been found to operate in the same manner as CoF_3, among which are MnF_3, CeF_4, PbF_4 and AgF_2.[18] The latter material has been used in the same type reactor as that used for CoF_3.[19] The temperature was held between 150° and 325° C., and the perfluoro derivatives of the following hydrocarbons were prepared: naphthalane, 1-methylnaphthalane, 2-methylnaphthalane, acenaphthane, indane, fluorane, dimethylnaphthalane, phenanthrane, anthracane, and fluoranthane.

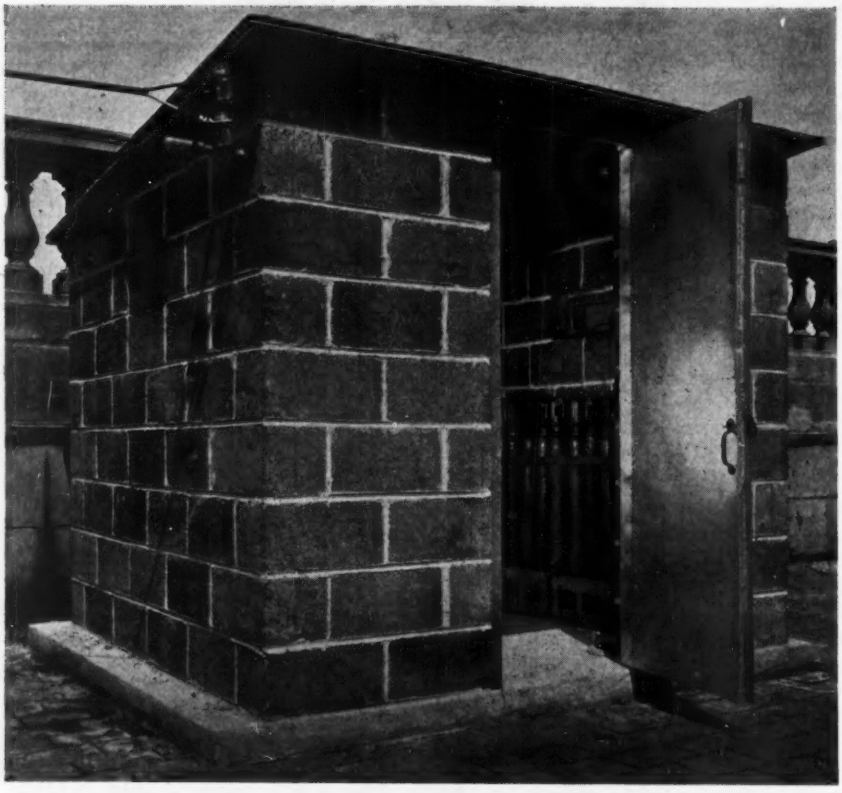
Petroleum hydrocarbons have been fluorinated[20] with silver difluoride suspended in a fluorocarbon solvent boiling above 200° C. The perfluorinated hydrocarbon was still higher-boiling and was separated by distillation (b.p., 137°-250° at 10 mm. Hg).

The yields are four to six times higher than those obtained by direct fluorination over a copper-silver catalyst. There is less "cracking" of the hydrocarbon than with CoF_3, but the process is more difficult and less economical.

CATALYTIC FLUORINATION

Although fluorine by itself is too undisciplined for direct fluorination, the technique for catalytic fluorination has been developed to such an extent that a fluorocarbon may be produced in a moderate to high yield by the reaction of the corresponding hydrocarbon with elementary fluorine.[21] The hydrocarbon vapor and fluorine are each diluted with nitrogen and mixed gradually in the presence

Harshaw cell head assembly is inspected after year of continuous operation. No defects had cropped up and only minor adjustments were needed. Some have run over 9 million amp.-hrs.



Fluorine cylinders are tested for leaks by storage at 130°F. on Penn Salt's roof. Carbon steel cylinders require specially designed gaskets, are painted silver with red tops and shoulders.

of fine copper turnings or ribbon coated with a thin layer of fluoride of silver. A slight excess of fluorine is passed and the catalyst is kept at 140° to 325° C. This procedure has been used to produce straight or branched-chain fluorocarbons ranging from C_4 to C_{16} and naphthenic fluorocarbons from C_6F_{12} to $C_{18}F_{30}$. Volatile hydrocarbon lubricating oils have also been fluorinated. Among the products obtainable are gases, liquids, waxy crystalline solids, lubricating oils, and brittle, rosin-like solids which soften to form oils when heated.

The relatively low yields obtained by direct fluorination can be explained in part by the diversity of side reactions. When the compound 4-chloro-1,3-bis (trifluoromethyl) benzene, for example,[22] was fluorinated, the following products were almost certainly identified in the complex mixture: (a) addition compounds $C_6H_3ClF_2(CF_3)_2$ and $C_6H_3ClF_4(CF_3)_2$; (b) the addition and replacement compound $C_6H_3F_7(CF_3)_2$; (c) the addition, replacement and substitution compound $C_6F_{10}(CF_3)_2$; (d) fragmentation compounds $C_6F_{11}(CF_3)$ and C_6F_{12}; and (e) some polymeric material.

FLUORO-COMPOUNDS

Although the number of fluorocarbons is great, there is obviously an even larger number of compounds in which substitution by fluorine is not complete. There are several techniques available for the introduction of one or more fluorine atoms into an aliphatic or an aromatic nucleus.

REPLACEMENT OF CHLORINE

Bromine trifluoride has been used to fluorinate hexachlorobenzene and pentachlorobenzotrifluoride.[23] The expected compounds, perfluorobenzene and perfluorotoluene, were obtained, but a large number of by-products, representing practically all degrees of chlorine replacement and double-bond addition, were also isolated and identified.

The simplest reagent for chlorine replacement is HF. Photochemical chlorination of *m*- and *p*-xylenes[24] gives the corresponding bis(trichloromethyl)benzenes which in turn gives the bis (trifluoromethyl) benzenes upon treatment with HF at 11° to 120° C. and 1300 to 1500 p.s.i. The yield depends on the isomer, the *p* giving more than the *m*, and the *o* giving none of the expected compound. Antimony pentachloride or antimony trifluoride employed as catalysts do not improve the yield but reduce the reaction time.

The same compound in which one, two or three chlorine atoms are present in the nucleus in addition to those in the side chain gives the corresponding trifluoromethyl derivatives. The compound $C_6HCl_3(CCl_3)_2$ gives $C_6HCl_2F(CF_3)_2$, where one of the nuclear chlorines is unexpectedly substituted by fluorine.[25] Various other polychloro aliphatic compounds have been partially fluorinated by this method, giving chlorofluoro derivatives of ethylbenzene,[26] heptane,[27] and unsaturated condensation products of the Prins type.[28]

REPLACEMENT OF AMINE

A convenient laboratory method for introducing a fluorine atom into an aromatic nucleus is by replacement of an amino group. This can be accomplished in at least two ways: (1) diazotization in anhydrous HF followed by elimination of nitrogen; and (2) diazotization in the usual manner followed by isolation and thermal decomposition of the diazonium fluoborate.[29]

FLUORINATED ACIDS

The makings of a perfluoro nylon are indicated by a series of reactions[30] starting with hexachlorobenzene. Fluorination of this with antimony pentafluoride gives 1,2-dichloroöctafluorocyclohexene, which may be oxidized with aqueous potassium permanganate to give perfluoroadipic acid in good yields. This may be converted in turn to the diethyl ester, the diamide, and the dinitrile. The latter may be catalytically reduced with hydrogen and platinum oxide in the presence of acetic anhydride to give the octafluoro-1,6-hexanediamine.

Oxidation of various open-chain and cyclic olefins gives fluorinated acids; $CH_3CF_2CCl{:}CH_2$, for example, yields CH_3CF_2COOH. Perfluorosuccinic acid is obtained from hexafluorocyclobutene and from 1,2-dichloro-3,3,4,4-tetrafluorocyclobutene-1.[31]

Cyclobutane derivatives, mentioned in the preceding paragraph, are much more stable when the carbon atoms are loaded with halogens. Ethylene derivatives, in fact, will dimerize to cyclobutanes. $CFCl{:}CCl_2$ gives an open-chain butene, but $CF_2{:}CCl_2$ gives 1,1,2,2-tetrafluoro-3,3,4,4-tetrachlorocyclobutane.[32] The absence of 1,1,3,3-tetrafluoro-2,2,4,4-tetrachlorocyclobutane shows that the dimerization is not random.

DIMERS AND POLYMERS

The fluorine-containing polymer which has received the widest attention is Teflon (polytetrafluoroethylene). The monomer is obtained by pyrolysis of monochlorodifluoromethane.[33] By-products of the reaction are a series of compounds of the formula $H(CF_2)nCl$ (where $n = 2$ to 14 have been isolated), a series of cyclic perfluorides from C_3 to C_5, and some toxic compounds tentatively identified as fluorochloromethyl cyclopropanes.

Dechlorination with zinc dust of $CF_2ClCFClCFClCF_2Cl$ gives perfluorobutadiene-1,3,[34] which polymerizes thermally to the dimer and trimer and with peroxides to waxes, oils, and thermoplastic resins.

Polymers ranging in consistency from oils to hard resins are also obtained from perfluorovinyl chloride.[35] Final treatment of the oils with cobalt trifluoride increases their thermal and chemical stability.

Fluorination of perhalo-olefins gives the normal addition compounds and dimers.

$CFCl{:}CFCl$, for examples, gives $CF_2{-}ClCF_2Cl$ and $CF_2ClCFClCFClCF_2Cl$. Compounds with more than one double bond are converted to polymers of relatively high molecular weight by fluorination.[36]

ANALYTICAL METHODS

Fluorine-containing compounds can be decomposed by reaction with sodium in liquid ammonia in a sealed system at room temperature, converting the organic fluorine to fluoride ions. Determination is made by precipitation of fluoride as lead chlorofluoride under closely controlled conditions of temperature and chloride-ion concentration. Other halides can be determined by standard methods.[37]

Residual hydrogen in halocarbons can be determined by pyrolyzing the compound at 1300° C. in a platinum tube in an atmosphere of nitrogen. In the absence of chlorine, the only acidic compound formed is HF. The pyrolysis products are absorbed in distilled water, the solution filtered, boiled and titrated.[38]

SULFUR HEXAFLUORIDE

Sulfur hexafluoride is finding its principal application as a gaseous dielectric in high-voltage generators. It is prepared by the direct action of fluorine upon molten sulfur. The combustion is smooth and complete. The resulting gases contain, in addition to SF_6, some of the lower fluorides S_2F_{10}, SF_4, and S_2F_2. HF and sometimes O_2, N_2 and F_2O may be present as impurities in the fluorine used. A scrubber with aqueous KOH removes the HF, F_2O, S_2F_2 and SF_4; and the S_2F_{10} is decomposed by passage through a heated coke-packed tube into SF_4 and SF_6, whereafter the tetrafluoride is removed by a second scrubbing. The sulfur hexafluoride is conveniently stored as a liquid in steel cylinders certified for 700 p.s.i.[39]

NEW USES FOR HF

The liquid-phase oxidation of organic compounds with molecular oxygen in anhydrous HF at temperatures below 200° C. has been found to yield other products than usual oxidation procedures. Benzene, for example, was oxidized to phenol in 100 per cent yield, although the percentage conversion was considerably less. The formation of *o*-cresol from toluene in much greater amounts than benzoic acid, and the formation of β-naphthol from naphthalene, indicates that a reaction has been found for ring oxidation in preference to side-chain oxidation.[40]

Since the heat of combination of hydrogen and fluorine is approximately twice that of hydrogen and oxygen, a torch using the first-named elements should give a more intense heat than any other type of torch. The hypothesis was borne out in an investigation where a concentric-tube, tip-mixing type of torch was used with fluorine in the inner tube. The intense bluish-white flame was found to be especially useful for welding copper, since the copper fluoride formed fuses at a lower temperature than copper and the welding operation is therefore self-fluxing. Nickel, Monel and steel were welded with equal facility.[41] The temperature was estimated to be over 6000° F.

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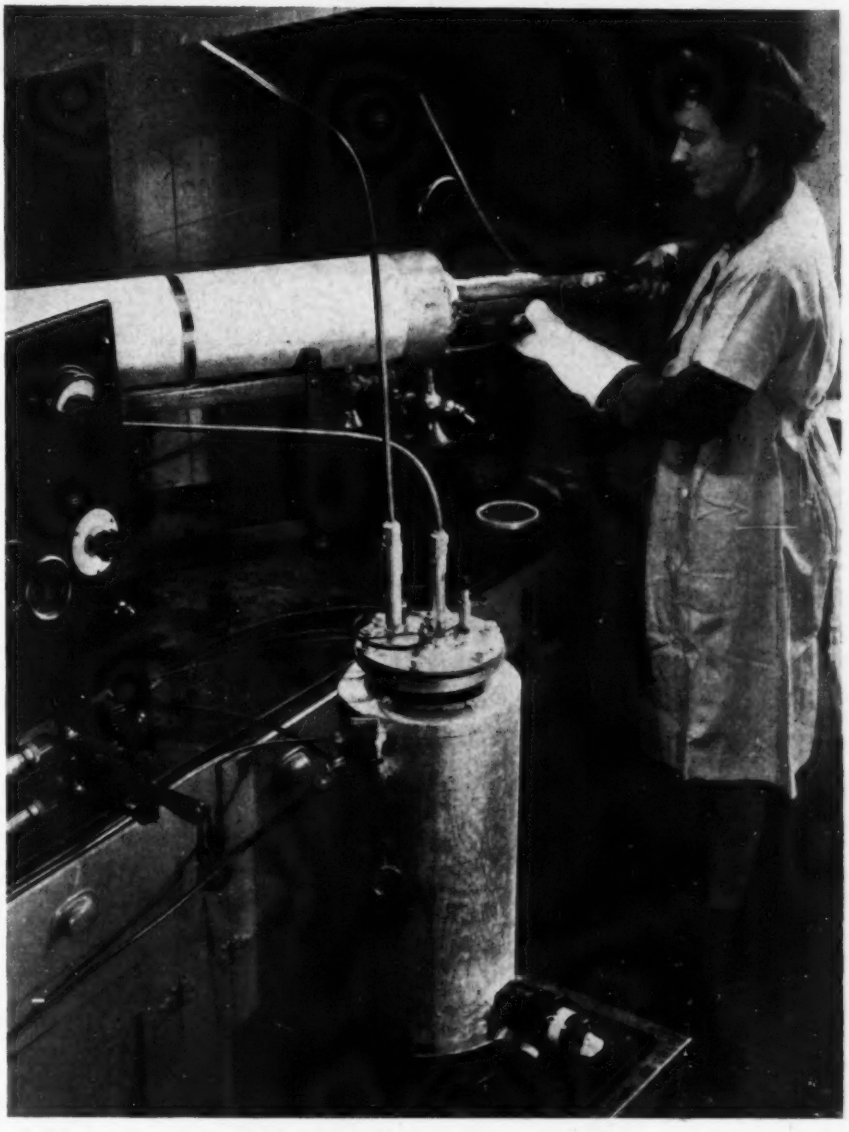


Fluorinating agents are being prepared on laboratory scale. Fluorine atmosphere for small electric furnace is provided by Harshaw laboratory-model electrolytic generating cell.

BRAKE FLUIDS Face A Lively Future

by J. MITCHELL FAIN
Foster D. Snell, Inc.
Brooklyn, N. Y.

TWENTY YEARS AGO FEW REALIZED that fluids for hydraulic auto brakes would become the tank-car business it is today. The great strides made in the formulation of brake fluids; the advent of radically new synthetic materials; and, the resurgence of the automobile business, promise an active future for the makers of both the finished fluids and their components. The current trend is toward improvements in quality and standardization of specifications —moves fostered by the S.A.E. and many state highway departments.

THE automobile industry, symbol of American mass production and bellwether of industrial reconversion, is now partially back on its feet. Next year the output of cars and trucks will reach an estimated total of 4,750,000. With the resurgence of the auto business, hydraulic brake fluids find a bigger market and some new contenders in the field heretofore dominated by castoid oil based materials.

Brake fluids now represent a market for 3 to 4 million gallons per year of special lubricant oils, solvents and chemical additives. The value of the hydraulic brake fluid formulations next year will be around $6 to $8 million. Auto registration is now about 25 million—off 4 million from the prewar high. Approximately 22 million of these cars equipped with hydraulic brakes mean a replacement volume of brake fluid variously estimated at figures up to a pint per car per year. New cars need a pint and up—as high as two quarts in cases.

HOW THEY DEVELOPED

Hydraulic brakes were first used in 1922 on the Dusenberg. Quick to follow was the Stutz, but these early systems were quite different from those in use today. The classic Lockheed hydraulic system, invented by Malcolm Loughead,[1] was first used on the 1924 model Chrysler. Many other cars followed in rapid succession. The last of the major auto firms to bandon mechanical braking was Ford, which in 1938 renounced its slogan, "The safety of steel from pedal to wheel," and installed hydraulics.

The original Lockheed system used as the fluid a mixture of approximately equal volumes of castor oil and ethanol. The brake system consisted of reservoir and master cylinder with its piston actuated by the brake pedal, four wheel cylinders with pistons which expand the brake shoes against the drums, and the connecting tubing.

For years the ethanol-castor oil mix was the standard, though others such as glycerol-ethanol and glucose-water-ethanol have occupied a small place in the market. By the early 1930's hydraulic brakes were

[1]U. S. Patent 1,525,942.

relatively numerous, and experience gained with their performance had shown certain deficiencies in the hydraulic fluids. The chief shortcomings of the castor oil-ethanol mixture were its rather high volatility which resulted in losses from evaporation, and its tendency to corrode certain of the metal parts of the system, particularly aluminum alloys, copper and brass.

A long list of patents tells the story of the gradual development of improved brake fluid formulations. The first improvements dealt with the corrosion problem—neutralization of residual acidity in the castor oil, inhibiting action on metals. Almost simultaneously there were numerous attempts to find solvents that would decrease the voltatility of the mix without sacrificing anything on viscosity, pour point, and inertness to rubber. Higher alcohols, ethers, esters and glycols figured prominently in many of the improved fluids. Additives were developed for increasing the stability of the mix, inhibiting corrosion and generally extending the range of desirable properties.

In recent years there have been several patents covering the use of synthetic organic materials as alternates for the castor oil base material. A group of these, Ucon* lubricants, on which patents are pending, has come into commercial use.

WHAT THEY MUST DO

While no official industry-wide standards have been set for hydraulic brake fluids, tentative specifications have been drawn by the Society of Automotive Engineers to protect the motoring public from the use of inferior products. The general functions they must perform and the properties they must possess have become rather generally recognized by both makers and users. Basically the function of the fluid is to transmit pressure evenly to the remotest parts of the system under all conditions of operation and to behave uniformly over long periods of time. Pressure must be transmitted without appreciable friction by a fluid which will lubricate all parts of the system even at high pressures. More specifically, it must be sufficiently penetrating to form oily films between working surfaces without inducing any appreciable leakage.

All these fluid and lubricating properties must be maintained over the considerable temperature range of about —50 to 220°F. or even higher under certain conditions. Over this entire range the viscosity of the fluid must stay within reasonably narrow limits—i.e. the viscosity index must be quite high. The lower temperature limit is usually set by the minimum pour point, the upper by such limitations as flash and boiling points or evaporation rates.

The brake fluid formulation must be such as to avoid any changes of state over the full range of operating conditions and over an extended period of life. If the fluid solidifies, gels or precipitates at low temperatures, or on aging, the entire brake system may be rendered inoperative. Excessive evaporation decreases the volume of fluid in the system, may alter the physical properties, and can result in a "vapor-lock," under which condition braking action is delayed or the system may fail to operate at all.

Low thermal expansion is desirable to minimize difficulties in maintaining fine adjustments of the system. A moderate tolerance for water is important, for minor amounts of moisture may enter the system inadvertently through condensation, leakage, or accident. A water tolerance of 5 to 10% should allow enough latitude for all normal service conditions.

Chemically the brake fluid should be stable of itself and inert to all the normal materials comprising the brake system. The principal materials of construction are: rubber, cast iron, steel, copper, brass, aluminum alloys, and die casting alloys. Probably the greatest problem is that of the swelling, softening and scuffing of the rubber piston cups in both the master cylinder and the wheel cylinders. Some moderate swelling of rubber is permissible and may even be beneficial. Softening, scuffing or partial solution of rubber is intolerable. Though it is theoretically possible to use more resistant synthetic rubbers or even plastics, the existence of some 22 million cars having natural rubber parts makes it mandatory that any hydraulic brake fluid going onto the general market be non-injurious to the standard rubber equipment.

It is most important that the automotive brake fluid be compatible with all the other fluids in general use. Serious impairment of the brake system can result from the phase separation occurring when two immiscible liquids are mixed. For example, the addition of glycerol or glucose-based fluids to a castor oil material produces two phases, neither of which is desirable. The water-solvent-glycerol (or glucose) phase has inadequate lubricating value; the castor oil phase has too high a solidification temperature. Since the service man has no knowledge of fluid properties, it is unwise to put two or more incompatible materials into his hands.

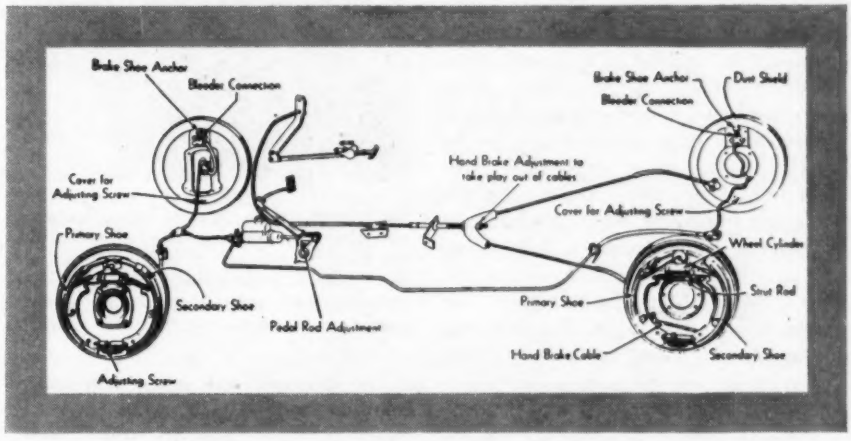
WHY CASTOR OIL IS USED

Over a long period of years castor oil has held a dominant position in brake fluid formulations, and its use in hydraulic fluids has accounted for a major portion of the domestic castor oil production. It is unique among all naturally occurring oils of animal, vegetable or mineral origin, in that it has substantially no action on rubber. Just why castor oil does not affect rubber compounds is not known, but it is the only natural oil containing appreciable amounts of ricinoleic (hydroxyoleic) acid. Since this acid, which makes up about 85% of the fatty acid content of castor oil, is the only common oil component having both hydroxyl and carboxyl groups, it is presumed that this combination is responsible for its inertness toward rubber. Furthermore, castor oil has been available in the quantity and at a price that readily justified its use in brake fluid compositions.

Refined castor oil possesses to a high degree the requirements for a lubricant and bodying agent for brake fluids. It cannot, however, be used alone because of its rather high solidification temperature (0°F) and its high viscosity at low temperatures (about 50,000 S.U.S. @ 32° F). Hence all castor oil based brake fluids contain various solvents which lower the pour point and viscosity while maintaining its other desirable properties.

The range of castor oil formulations available has been enormously increased by the use of a number of bodied oils. Refined raw castor oil has a viscosity of about 1300 S.U.S. @ 100° F. Various processed oils have corresponding viscosities running all the way up to 130,000. Thus by selecting one of the processed oils, or by blending the raw oil with one of the processed materials, it is possible to obtain a base of almost any desired viscosity within the range stated above.

A further extension of the range of properties of castor oil bases can be obtained by the use of glycerol triaceto



Hydraulic brake installation on a passenger car showing general arrangement of parts.

* Trade-mark of Carbide & Carbon Chemicals Corporation.

ricinoleate, a castor oil derivative. This material has a very high viscosity index—about 130—and it has the ability of imparting this property to raw or processed oils approximately in proportion to the amount used in the blend. While raw and processed castor oils are practically inert to rubber, this particular ester has a moderate swelling action and usually requires the use of an inhibitor.

The various raw, processed and modified castor oils are stable at temperatures of 400° F or higher. They are essentially non-volatile, having negligible vapor pressures even at high temperatures.

Refined raw castor oil has an acid value of about 2.0; certain of the processed oils have similarly low values, but some others have acid values ranging up to 26. Since most brake fluid specifications call for an acid value of 1.0 to 2.0 some neutralization may be necessary. Though it is usually better to control acid value by the initial selection of ingredients, the soaps formed by neutralization with caustic exert a depressing effect on the polymerization that sometimes occurs at prolonged exposure to high temperatures.

Although castor oils are non-drying, they do oxidize slowly and become somewhat gummy after prolonged exposure at elevated temperatures. This oxidation can be inhibited to a very large extent by the addition of small amounts of hydroquinone, pyrogallol or catechol. The most common treatment is 0.1% of hydroquinone. Normally the gumminess resulting from oxidation causes little trouble except in the wheel cylinders where exposure in thin films to the dust and heat of the brake shoes may eventually result in sticking of the pistons. Unless oxidation is inhibited, the acid value may increase on ageing from a value of 2.0 to 35.0 or higher. This higher acidity tends to promote the corrosion of metal parts, particularly brass.

HOW THEY ARE FORMULATED

Although castor oil combines a large number of the desirable properties for a hydraulic brake fluid, it is still necessary to dilute it with appropriate solvents to reduce the pour point and viscosity. The selection of the proper solvent actually represents the major problem in brake fluid formulation. The solvent must not only possess most of the same properties of the base—miscibility with castor oil, additives and other components; minimum effect on rubber; non-corrosiveness to metal parts—but it must also have a very low freezing point and a relatively high flash or boiling point.

The requirement that the solvent be non-injurious to rubber is the main obstacle, for it rules out all but a few materials. This specification eliminates the following solvents which might otherwise be quite satisfactory: chlorinated organic compounds, aromatic hydrocarbons, mineral oil fractions, acetone, ketones, pine oil and turpentine. The principal classes of solvents that are suitable are alcohols and glycol ethers. Choice even within this group is restricted by price and availability.

The more important alcohols used in brake fluid formulations are ethyl, isopropyl, normal, iso- and secondary butyl, diacetone, and methyl pentanediol. Other important solvents are methyl, ethyl and butyl Cellosolve; methyl, ethyl and butyl Carbitol. Since alcohols higher than C-2 or C-3 have an increasing swelling action on rubber, it is usually necessary to employ an anti-swelling agent. Several common polyhydric alcohols are used for this purpose, among them ethylene and propylene glycols. Glycerine cannot readily be used because of its incompatibility with castor oil.

Oil from the castor bean is unique among all naturally occurring vegetable or animal oils. Its chief constituent is glyceryl ricinoleate, the ricinoleic acid radical having an unusual structure with both hydroxyl and carboxyl groups on the same straight-chain molecule.

The glycols serve other very useful functions besides that of inhibiting the attack on rubber. They are valuable pour-point depressants. They have an excellent water tolerance, a property which they impart to the mixed fluid.

The glycols are only partially miscible with castor oil-alcohol blends, hence the quantity that can be employed is limited. This, however, is not a serious restriction, for in most cases the miscible range runs from 20 to 50% of glycol in the final fluid. The zone of complete solubility in three and four component systems varies with the particular glycol, alcohol, and with the castor oil blend that is used.

Important brake fluid properties—flash point, boiling point, evaporation rate and pour point, are very largely dependent on the solvent that is incorporated in the mix. In most common formulations the solvent ranges from about one-half to two-thirds of the total mixture. In this range the boiling point of the finished fluid approaches very closely that of the solvent alone. Thus the volatility characteristics of the final fluid can be judged reasonably well from these same properties of the pure solvent.

There is a considerable advantage in the use of bodied castor oils for fluids that must have exceptionally low pour points. Such processed oils have a higher initial viscosity, and thus permit the use of greater amounts of solvent. Since the pour point of the processed oils is nearly the same as that of the refined raw oil (0 to 15° F) the addition of greater amounts of solvents with freezing points ranging from —40 to —160° F., results in a proportionate decrease in the pour point of the mix.

It is necessary to give consideration to the cloud point temperature in formulating three and four component fluids, especially those involving such partially miscible components as the glycols. A fluid that is perfectly clear at ordinary temperatures may develop a partial separation into two phases at lower temperatures. Frequently this separation is evidenced by a cloudiness caused by the formation of a second phase existing as a suspension of very fine droplets or particles. Because this cloudiness often develops rather slowly, it may be necessary to test a formulation for aging at low temperatures to insure that the components and their proportions are satisfactory for the service conditions required.

Corrosion of metal parts has been effectively controlled in modern hydraulic brake fluids by the use of small amounts of inhibitors. Perhaps the most common additive for this purpose is diamylamine phosphate, frequently added as 1 to 2% of the total fluid mixture. The corrosion problems are different with the different metals. Iron and steel are generally passive to brake fluid components (except for glycerol). Aluminum and its alloys are attacked by glycols, glycol ethers and glycerol unless an inhibitor is used. Copper and brass may be corroded by free fatty acids, a condition avoided by the use of refined castor oils, neutralization and oxidation inhibitors. Excess alkali may attack aluminum and die casting alloys and the zinc contained in brass. Although alkalinity in the range of pH 7.5 to 8.5 is normally safe, most specifications call for a final adjustment slightly on the acid side with the acid number between 1.0 and 2.0.

NEW SYNTHETIC BRAKE FLUIDS

For nearly twenty years the castor oil based brake fluids have dominated the market. Over this period the market has grown to considerable proportions. The continued development of the castor type fluids has made the modern products vastly superior to the originals. The rapid growth and rather lucrative nature of the market has set an incentive for the development of other materials. Obstacles to the easy entrance into the field have been the necessity of achieving compatibility with the well established castor oil based

fluids; the general fluid requirements, particularly that of inertness toward rubber; and, in cases the limitation of cost.

Recently a new type of brake fluids has appeared commercially with Ucon lubricants made by Carbide and Carbon Chemical Corp., comprising the lubricating base. Because the patents on these materials are still pending, their composition and origin have not been stated. It is understood, however, that they were widely used to lubricate military aircraft engines during the war in cold weather areas.

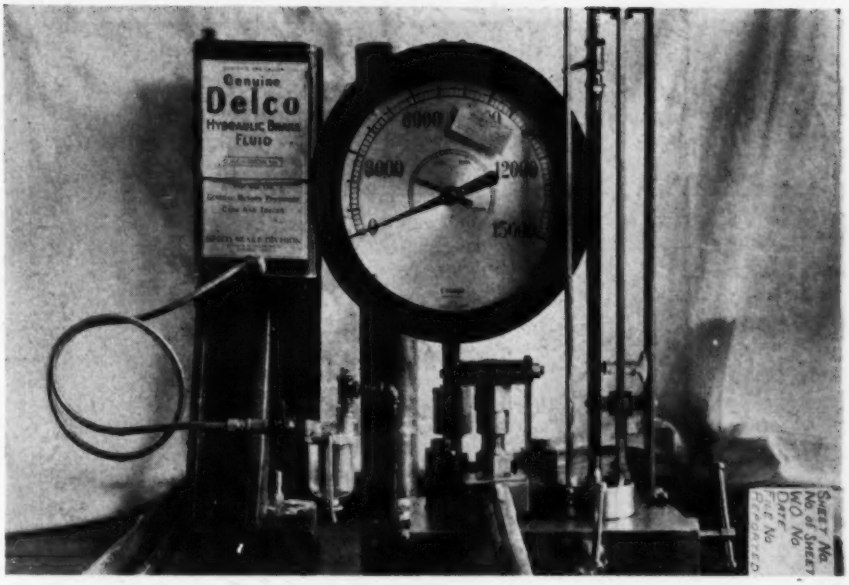
The most significant new development in the commercial brake fluid market is the recent acceptance of formulations containing Ucon lubricants as the standard brake fluid by several of the largest automobile manufacturers. It is stated that Ucon brake fluids have been on the market for several years but quantities available have been limited by shortage of suitable solvents. These new fluids are formulated in much the same manner as the castor oil based materials with Ucon lubricants being employed as the lubricating base. In fact, special care is taken in selecting and blending all components to insure complete compatibility with castor oil based fluids.

Ucon synthetic lubricants are well suited to brake fluid formulations for they satisfy all the general requirements outlined above. Of particular interest are the very low pour points (—30 to —80° F) and the high viscosity indexes (140 to 160) of the lubricant bases before formulation.

Since Ucon lubricants are synthetic products, they can be tailored to a considerable degree to give nearly any desired viscosity. Flash points range from 300° F up; the density is approximately that of water. They are physically and chemically stable, and are essentially inert toward rubber. There are two types of Ucon lubricants: water soluble, and water insoluble. Both types are used in brake fluids with suitable solvents to produce fluids having the desirable properties. Furthermore it is understood that Ucon fluids have no gum forming tendencies.

While Ucon lubricants are the only suitable new synthetics known to be commercially available, there has been considerable attention given to other organic compounds that might also serve as castor oil substitutes. Government sponsored research during the war involved the examination of some 90 non-hydrocarbon materials as brake fluid base stocks. Two recent patents have claimed brake fluid formulations based on diethyl cyanamide and on 2,4-dimethyl sulfolane, both of which are stated to be compatible with castor oil and otherwise suitable for brake fluids.

The use of hydraulic fluids in aircraft is beyond the scope of this article, but a brief review of this field is interesting because of the contrasts it presents. Hydraulic mechanisms are used on airplanes for many functions besides wheel braking. Landing gear retracting devices, wing flaps, wing folding mechanisms, controls and many other devices are hydraulically operated.



Modern practice calls for thorough testing of brake fluid formulations. Above is one of the types of equipment employed in the testing suitability of prospective hydraulic fluids.

Problems of inertness toward natural rubber and compatibility with castor oil are less than with automobile brake fluids, for plane makers specified solvent resistant synthetic rubbers and plastics early in the war. As a result petroleum based fluids have figured very largely in the aircraft hydraulic fluid field. It is interesting to note that the armed forces used different coloring dyes in both the castor oil and petroleum fluids to distinguish the two incompatible types.

The matter of flammability, always a subject of concern in airplane operation, has recently become more acute as a result of several serious difficulties with one type of commercial transport. It is understood that there is a new type of hydraulic fluid now in the experimental development stage that is essentially non-flammable. As its name "Hydrolube" implies, one of its major components is water. Water properties are modified to meet low temperature requirements by the use of glycols. The base material to supply the body and lubricant properties can be a special Ucon lubricant or a methacrylate polymer. According to reports the former is preferred because it stands up better under the mechanical action of the hydraulic fluid pumps used so widely on planes. Of course, rather liberal amounts of inhibitor must be added to minimize corrosion from the water solution. This particular fluid is very similar to one reported in certain German military equipment during the war.

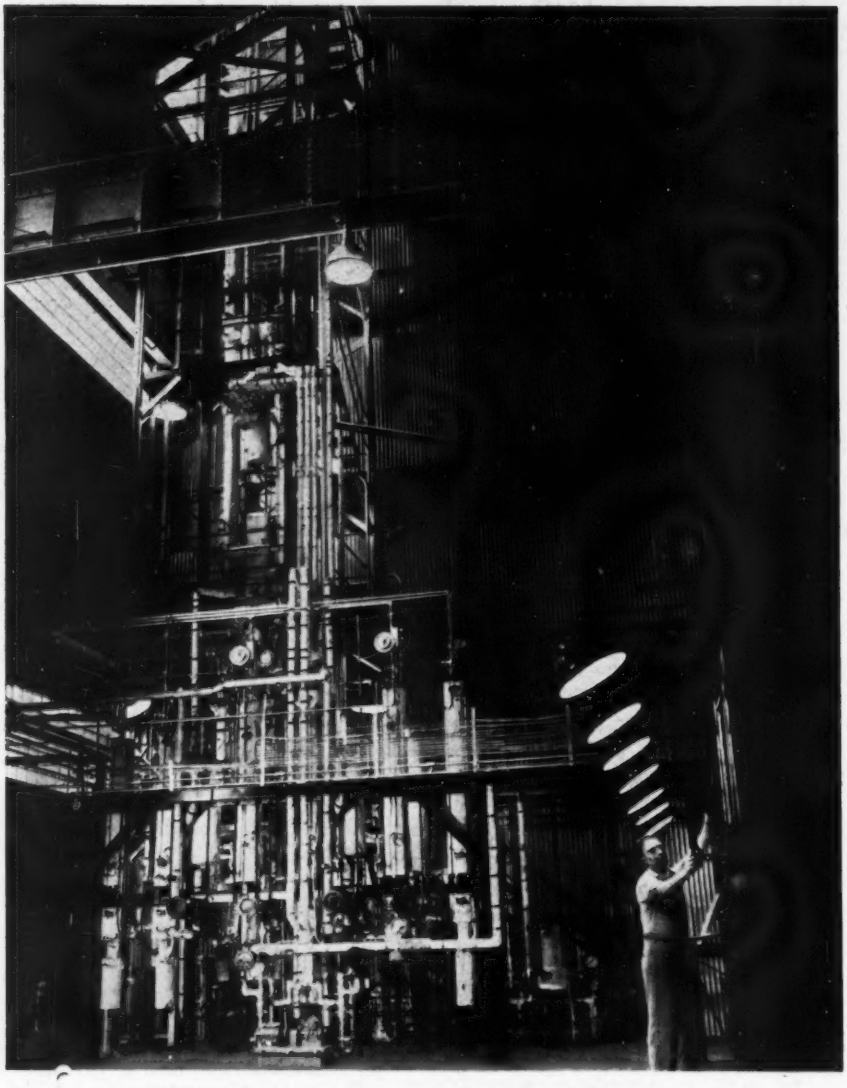
Should this Navy sponsored development succeed, it may revolutionize the entire aircraft hydraulic fluid business. However, such fluids containing large amounts of water are not likely to cause any immediate change in automotive brake fluid formulations, because they would not be compatible with castor oil fluids.

While the variety of uses on airplanes is large and the amount of fluid used on each plane considerable, it does not appear that the total volume of hydraulic fluid business for aircraft will rival the automotive brake business in the near future. At the height of the war the total aircraft hydraulic fluid consumption ran to quite large volumes, due largely to the very exaggerated conditions of combat maintenance.

WHAT THE FUTURE HOLDS

The present demand for 3 to 4 million gallons per year of automotive brake fluids is being met only with considerable difficulty. Practically all of the materials used in formulations are very hard to get —castor oil, solvents, and Ucon lubricants. But the outlook for the future is bright. Automobile registration, shrunk by the war, should climb to a normal figure of 30 million within a few years, and the production of new cars may be expected to increase as soon as reconversion difficulties are ironed out. Furthermore, cars with mechanical brakes, still on the road, will be retired within a few years. Thus, the brake fluid market may expand by about 30% within three to five years. Within a short time practically all autos in service will be equipped with hydraulic braking systems.

The automobile business, and hence the brake fluid business, is normally competitive both as to price and performance. In such a market chemical manufacturers supplying brake fluid components or formulated fluids must be quick to perceive the significance of automotive design changes and to foresee the needs for better hydraulic fluid performance. The brake fluid business has never stood still in the twenty years since it began. The future looks even more lively.



Much of the data for the design of the five plants, which are now being engineered for the application of the Solexol process to fats and oils, was obtained in this pilot plant.

THE SOLEXOL PROCESS

A New Tool for Refining Fats and Oils

EDITORIAL STAFF REPORT

PRESENT METHODS OF REFINING FATS AND OILS involve chemical action, which usually gives an economically degraded product. The new Solexol process employs solvent extraction, recovering many of the impurities as salable materials. It also permits glyceride fractionation. Propane is used as the separation medium.

FOR many years the methods utilized in the refining and fractionation of fats and oils (8,778,009,000 lbs. consumed in 1945) have suffered from the twin disadvantages of degradation of a large portion of the components removed in the refining operation by chemical action and the physical loss of the glyceride being refined. This latter loss results from entrainment in the soaps produced by the action of the alkaline refining agent upon the free fatty acids being removed and an undesired saponification of the neutral oil.

The Solexol process, recently announced by the M. W. Kellogg Co., is reported to avert these difficulties in that it involves no chemical reactions for removal of the color bodies, odorous constituents, etc. Propane is used as the separation medium. Proper handling of the process allows recovery of materials previously destroyed or reduced in value, such as the free fatty acids, pigments, vitamins, etc. In addition, it produces a separation according to molecular weight and structure and varying with the temperature at which the extraction is carried out, the critical temperature of propane (206° F.) providing the upper limit of operation.

PRESENT PROCESSING METHODS

Until the announcement of the Solexol process practically all refining of vegetable and animal fats and oils relied on the use of alkalies for purification and deodorization. As it was originally carried out, alkali treatment was a batch process[2] but through the work of James[3] and of Clayton, Thurman and associates[4] it was transformed into a continuous operation about 1933. The continuous process produced improved yields because of the better separation attendant on continuous operation. However, the losses were still appreciable because of the saponification of a certain amount of the neutral glycerides and entrainment of neutral oil.

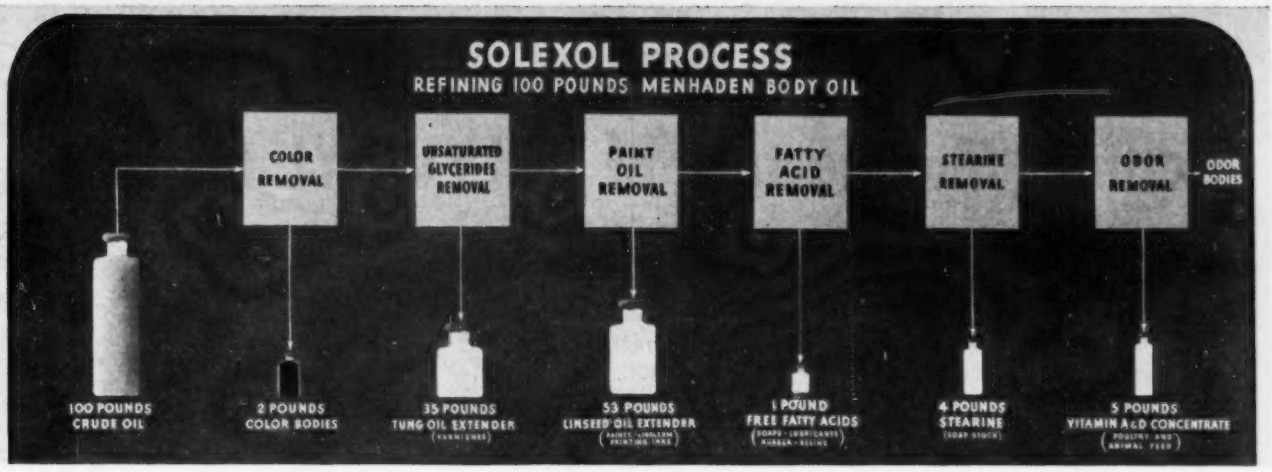
In general, weaker alkalies than sodium hydroxide give a satisfactory removal of fatty acid and also give a lower loss of neutral oil by saponification. However, their inability to remove color bodies when used alone, and the aforementioned entrainment problems, have thus far served as a bar to their use.

Recently, however, a combination caustic soda-soda ash treatment[5] has been introduced in the United States which is reported to still further reduce neutral oil losses. The use of organic alkalies, such as monoethanolamine[6], has been patented but no installations are known. Bleaching with chlorine dioxide[1] was recently described.

SOLEXOL PROCESS

The Solexol process is based in part upon certain researches at Columbia University, which were sponsored by the Chemical Foundation, and can be operated for the fractionation of tall oil[7] and of fatty acids[8], as well as fats and oils[9], into their constituent parts.

As developed by Kellogg the process can remove a single type constituent—as in the removal of phosphatides (lecithin) from corn or soy bean oil—or separate the oil into several fractions. In any case the process is continuous and one contacting section must be provided for each operation carried on. Thus, if it is desired to separate only the pigment materials



from sardine body oil, one contactor is required while if it is desired to further fractionate it into a drying oil, fatty acids and stearine, additional contactors must be provided.

A particular advantage of Solexol is its flexibility, as proper control of conditions will enable up-grading of the cheaper materials, allowing the ratio of type of products to be varied at ease, depending on the supply and demand existing at the moment, thus enabling the refiner to better follow the market.

Fish Oils. Fractions containing 3000-5000 International Units of vitamin A per gram and 1000 IU of vitamin D can be obtained from such low grade oils as sardine and menhaden oils. These have been uneconomic for vitamin recovery via present refining processes, the saponification process and molecular distillation. The Solexol process is also applicable to refining present vitamin sources such as cod liver oil, shark liver oil, etc. Of great importance here is the fact that the residual oils are not degraded by the process when the vitamins are recovered but are refined with propane in contacting columns to produce a free fatty acid fraction, a glyceride fraction whose unsaturation is equal to that of tung oil (21,569,000 lbs. consumed in 1945), another whose unsaturation is equal to linseed oil (495,-880,000 lbs. consumed in 1945), stearine, and sterols.

Vegetable Oils. Taking soy bean oil (1,280,372,000 lbs. consumed in 1945) as an example, it has been reported that the first fractionation will give about 1.5% of pigment and lecithin, useful as an emulsification agent for food stuffs and cosmetics, and 98.5% of refined oil which may be further fractionated. If further fractionation is decided upon, a yield of 30.0% paint oil may be expected, 1.0% of a sterol concentrate and 67.5% of an edible oil. Similar fractionations can be achieved on other vegetable oils.

Animal Oils. It is the desire of the soap maker to produce a pure white product. However, a large percentage of the beef tallow (1,327,268,000 lbs. consumed in 1945) available to him possesses a very undesirable dark color. Solexol permits decolorization of the tallow with a yield approximating 99% of pure white material, thus upgrading previously unusable grades to a par with the best white tallows. Other applications include the refining of wool grease and up-grading of other animal fats.

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FACTORY CONSUMPTION OF PRIMARY FATS AND OILS IN THE UNITED STATES, BY USES, 1943-45
Bureau of the Census
(Quantities in thousands of pounds)

			FACTORY CONSUMPTION OTHER THAN IN REFINING											
			Processed in--				Used in production of--							
								Inedible products						
	Total[1]	Used in Refining	Total	Fat splitting (Hydrolysis	Winterizing and pressing, except for salad oil	Sulphonation	Edible Products	Soap	Paint and Varnish	Linoleum and oilcloth	Printing ink	Lubricants and greases	Other[3]
1945	8,778,009	3,017,857	5,760,152	394,786	112,635	36,169	2,347,281[2]	1,757,506	475,562	77,907	37,331	91,581	429,394[2]
1944	8,808,787	2,770,722	6,038,065	306,249	106,909	34,626	2,400,188	2,001,611	536,156	83,409	30,036	91,423	447,458[2]
1943	8,649,686	2,919,805	5,729,881	280,664	134,870	34,775	2,634,027	1,715,421	444,342	74,466	22,498	80,459	308,359[2]

[1] A change in the reporting procedure in July 1944, by which whole oils used as such in cooking oil and salad products are not reported, affects the year-to-year comparability of the data for the total consumption of certain oils.
[2] Data for oils used in "Cooking and salad oils" and in "Salad dressing, mayonnaise, and other salad products" were not collected. However, data for whole oils used in winterizing for salad oils are shown under the heading "Winterizing for salad oils".
[3] Includes 2,011,000 pounds used in producing cutting oils for 1943; 3,362,000 pounds for 1944; and 4,290,000 pounds for 1945.

German Manufacture of POLYVINYL ETHERS

by GORDON M. KLINE, Chief, Plastics Section
The National Bureau of Standards
Washington, D. C.

EMPLOYING PROCESSES DEVELOPED BY their famed acetylene chemist, Dr. Walter Reppe, the Germans produced as much as 600 tons per month of polyvinyl ethers during the war for such uses as lacquer bases, adhesives, extrusion lubricants, and impregnating agents. The production techniques developed are significant, particularly in their use of continuous flow methods.

POLYVINYL ethers, an important and versatile family of synthetic plastics, were manufactured by I. G. Farbenindustrie A.-G. at Ludwigshafen and Oppau during the war, where peak production was approximately 600 tons per month. These polymers[1] are useful as lacquer bases, adhesives, and impregnating agents for paper, textiles, rubbers, and leathers.

The monomeric vinyl ethers are made by reacting acetylene under pressure with an alcohol at 160-175°C, using potassium hydroxide as a catalyst. Polyvinyl ethers, in turn, are made from vinyl ethers by polymerization, using boron trifluoride as a catalyst. The process was developed by Dr. Walter Reppe in the course of his investigations with acetylene as a source of synthetic materials.[2] Of the many possible polyvinyl ethers, three polymers accounted for the bulk of German production: methyl, ethyl, and isobutyl vinyl ethers.

VINYL ETHER MONOMERS

The production of the vinyl ethers is accomplished by a continuous process at Ludwigshafen.[3] A diagram of the equipment, which is constructed of ferrous metal, is shown in Figures 1 and 2. The reaction tower is filled two-thirds of its height with catalyst solution. For the methyl ether a 20-25 percent solution of potassium hydroxide in methyl alcohol is used; for the ethyl ether a 20 percent solution in ethyl alcohol; and for the isobutyl ether a 15 percent solution in isobutyl alcohol.

During operation alcoholic potash solution is passed into the tower at the bottom at the following rates per hour:

Methyl ether
700 kg. methyl alcohol 25 kg. KOH
Ethyl ether
800 kg. ethyl alcohol, 20 kg. KOH
Isobutyl ether
900 kg. isobutyl alcohol, 15 kg. KOH

Some alcohol is also pumped into the gas system to avoid contact of acetylene with dry potassium hydroxide.

Acetylene diluted with nitrogen is fed into the catalyst solution at the following rates per hour:

Methyl ether.....140 cubic meters
Ethyl ether.....200 cubic meters
Isobutyl ether.....240 cubic meters

For the methyl ether the gas is 55 percent acetylene and 45 percent nitrogen at 20-22 atmospheres; for the ethyl ether it is 60 percent acetylene and 40 percent nitrogen at 18-20 atmospheres; for the isobutyl ether it is 80-90 percent acetylene and 10-20 percent nitrogen at 4-5 atmospheres. The gas is preheated to 100-120°C. and circulated through the system by a pump of 50 cubic meters per hour capacity at normal pressure; the amount of gas passing through the tower can be calculated by multiplying the 50 cubic meters by the pressure in atmospheres.

A dephlegmator at the top of the tower has a cooling surface of 15 sq. meters and is kept at 120° C. The temperature at the bottom of the tower is 160-165°C. for the methyl ether, 155-160°C. for the ethyl ether, and 150-155°C. for the isobutyl ether.

The used catalyst mixture is drawn off the bottom of the tower at the rate of 100 kg. of solution per 500 kg. of vinyl ether produced and contains 20 percent of vinyl ether. The alcohol is recovered from the used catalyst solution in a discontinuous distillation process. Two vessels of 2 cubic meter capacity are used for this purpose to process 1000 kg. of solution per batch. In the case of the isobutyl ether, the solution is first washed with water. Then the constant boiling mixture is distilled, followed by a second distillation to separate the water from the alcohol. Five hundred kg. of alcohol are recovered from 1000 kg. of catalyst solution. The potassium hydroxide is discarded.

The distillate from the reaction tower contains per hour: 500 kg. vinyl ether (60 per cent), 300 kg. alcohol, 15 kg. acetylene, and 25 kg. acetals. The acetylene is removed by heating the distillate at 100-120° C. with a dephlegmator temperature of about 20° C. (cooling water temperature). This operation is conducted at the following pressure:

Methyl ether.....6 atm.
Ethyl ether.....4 atm.
Isobutyl ether.....Ordinary atm.

The mixture of vinyl ether and water which distills during removal of the acetylene is separated by gravity and the vinyl ether is returned to the column.

The crude vinyl ether fraction is distilled in a column filled with iron Raschig rings at the following pressures:

Methyl ether.....4 atm.
Ethyl ether.....1 atm.
Isobutyl ether.....Ordinary atm.

The temperatures at the bottom and top of the column are those of the boiling points of the ether and alcohol, respectively.

The mixture of alcohol and acetal is taken from the bottom of the column at the rate of 250 kg. of alcohol and 25 kg. of acetal per hour. This mixture is separated by distillation at ordinary pressure in a column with iron Raschig rings. The recovered alcohol is pumped back into the system. The acetals are removed from the bottom of the column for the methyl and isobutyl products and from the top for the ethyl product. The acetals are saponified in a discontinuous process to recover the alcohols. The aldehyde produced is distilled off, the alkali neutralized, the alcohol layer separated and distilled.

The crude vinyl ether distillate containing 500 kg. vinyl ether and 50 kg. alcohol is washed with water. It is pumped to a reservoir at the top of the washing tower to get the necessary head

Products and processes described in this article may be the subject of United States patents. Accordingly, it is recommended that the usual patent study be made before pursuing commercial applications.

for gravity feed. It enters the washing column at the bottom and is brought into contact with soft water at 5° C. For distillate containing 500 kg. of ether and 50 kg. of alcohol, 1000 kg. of water are employed. The wash water containing the alcohol is run off at the bottom to a distilling unit. In the case of the isobutyl ether, the isobutyl alcohol azeotrope is run to a separator and the isobutyl alcohol is transferred to a drying distilling column. Water comes off at the bottom of the first column and isobutyl alcohol at the bottom of the second column.

The washed vinyl ether is run through two drying towers containing granulated potassium hydroxide and the pure ether is obtained. Conversion of acetylene per pass is approximately 60 per cent; the total yield is as follows:

Vinyl ether	*Yield based on acetylene*	*Yield based on alcohol*
Methyl	95%	90-92%
Ethyl	92%	92%
Isobutyl	95%	95%

OPPAU PROCESS FOR VINYL ISOBUTYL ETHER

At Oppau vinyl isobutyl ether is made by a batch process.[4] Acetylene is passed through a mixture of 95 parts isobutyl alcohol and 5 parts sodium isobutylate in a tower 7 meters high and 50 cm. in diameter, holding a charge of 1600 kg. The reaction takes place at 120° C. and 20 atm. pressure for 8 hours. The product is washed at room temperature in a ring-packed tower with water to remove alcohol. The washed product is boiled under a nitrogen blanket with dry caustic. It is then distilled in a batch still with an unpacked column to separate the 90 per cent vinyl isobutyl ether from the higher boiling ether impurities. All distillation is carried out under a nitrogen blanket to avoid explosion hazard. The still pot is held at 90-95° C. and the product goes to a tube condenser. If the first distillation product still contains polymer, it is again distilled. The refined product is then put in a reflux pot with 15-20 kg. of sodium metal chips per 600 liters and re-

PRODUCTION OF MONOMERIC VINYL ETHERS AT LUDWIGSHAFEN

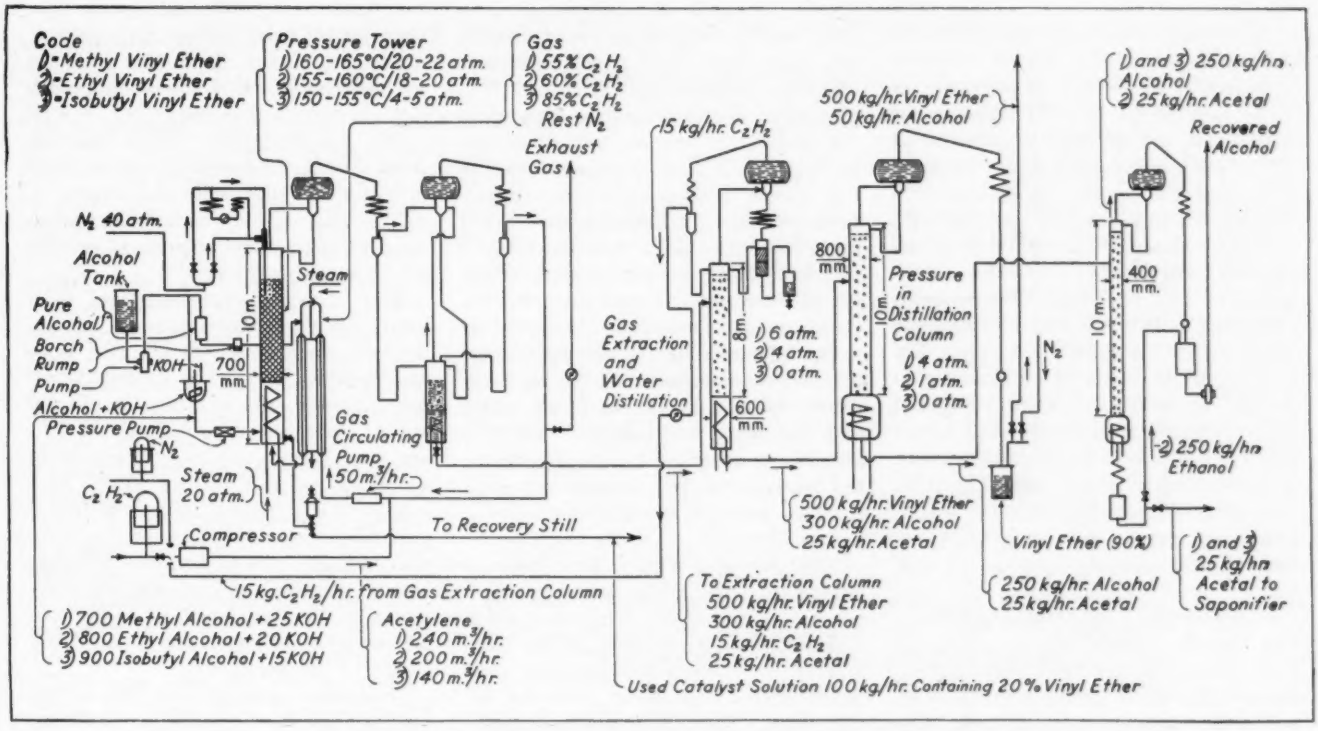

Figure 1—Flow diagram for production of monomeric vinyl ethers.

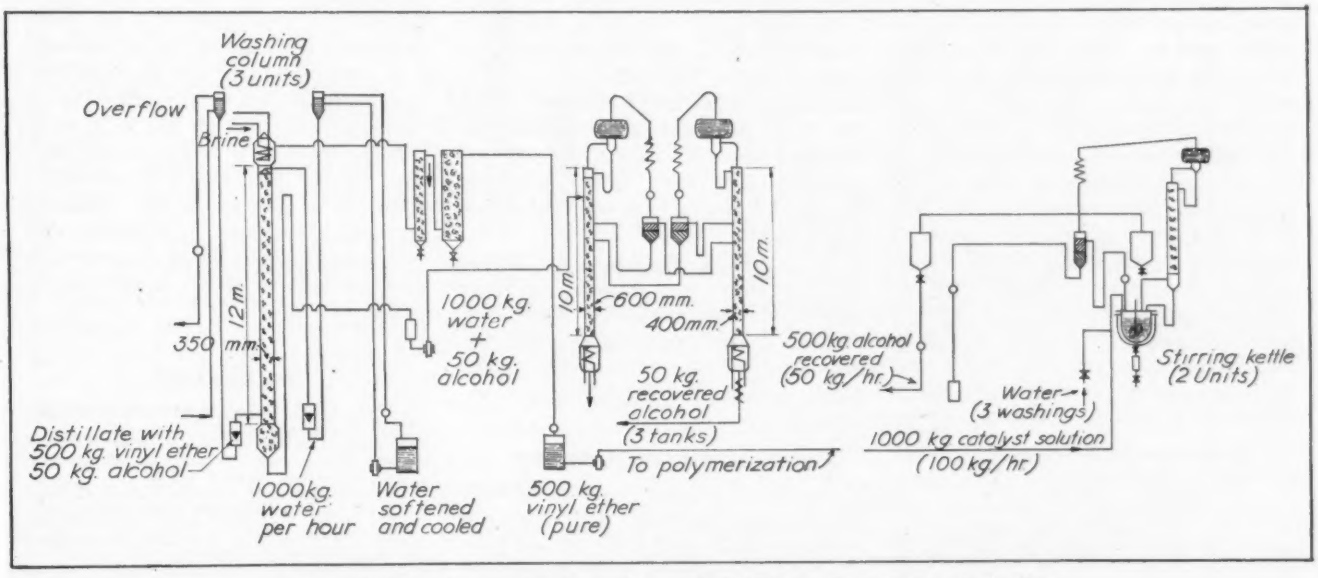

Figure 2—Flow diagram for the washing and distillation of monomeric vinyl ethers.

fluxed to remove the last traces of water, giving a pure ether. The sodium is left in the pot and used to dry several charges.

BATCH POLYMERIZATION OF VINYL ETHERS[3]

Bulk polymerization is the most important process. It is not possible to polymerize in aqueous dispersions because the ethers are saponified by acids. Only materials of low K-values* are obtained by polymerization in solution at elevated temperatures.

An enameled or stainless steel kettle equipped with a 25 kw. stirrer is employed. Cooling capacity to —30° C. and heating capacity to 120° C. are provided. The catalyst used is an addition compound of boron trifluoride and 2 molecules of water, made up to a 1 per cent solution in dioxane. Production of 1 cubic meter of vinyl ether requires 1.5 liters of boron trifluoride solution.

Fifteen to 20 per cent of the monomer to be used in the batch is added to the kettle. The methyl ether is cooled to 0° C. to keep it in the liquid state. The catalyst solution is run in drop by drop with stirring until the reaction starts as indicated by refluxing. The remainder of the monomer and catalyst are added over a period of 1 to 1½ hours. The temperature rises to 15 to 25 degrees centigrade above the boiling point of the ether. The temperature is then brought gradually to 80-100° C. over a period of 5-8 hours. After polymerization the residual monomer is distilled off; the yield of polymer is approximately 93 per cent. The polymer is a very viscous mass and is run into containers or into a kneader for making solutions.

CONTINUOUS POLYMERIZATION PROCESS[4]

At Oppau vinyl isobutyl ether is polymerized by a continuous process. The polymerizer consists of a continuous horizontal web-woven hemp or rayon belt 1 meter wide rolling between two drums a meter in diameter and about 9 meters between centers. Oblique idling pulleys spaced at intervals between the drums and underneath the belt edges form its top-face into a trough some 6 inches deep. The belt operates with the driving pulley's hub deep in water, at a speed of 1.5 meters/min. The monomer feed lines lead to a point about a foot above the place where the trough is first shaped on the roll, and the nozzles of the two lines are placed so that the feed will be well-mixed upon falling into the trough. A detachable hood fits over the whole belt assembly, being mounted in such a way that a water seal to hold the operating pressure of 250 mm. is maintained. The whole tank is made of steel.

The ether is cooled to —50 to —60° C., and 0.05 per cent of dibutylphenyl sulfide is added as a stabilizer. Propane cooled to the same temperature is added to the ether in a 4:1 ratio.

The catalyst consists of boron trifluoride in propane at —50 to —60° C. The amount of catalyst used depends upon the desired K-values; for a K-value of 50-60, 0.055 per cent of boron trifluoride, based on the ether, is added, whereas for higher polymers it may be as low as 0.01 per cent.

In operation, material at a temperature of —60° C. falls simultaneously from the ether and catalyst feed pipes to the belt. Polymerization takes place almost immediately when the catalyst mixes with the vinyl ether in propane solution. Propane rapidly boils off, thus controlling the temperature during polymerization. The interior temperature is about 17° C. throughout except around the area where the nozzle feeds meet the belt, which may be colder. Propane is pumped out of the system, washed, dried and reused. Propane losses from this system were said to be quite low. The polymerization is practically 100 per cent complete, and the product passes along the belt as a spongy mass 4 cm. thick. The polymer is carried into water by the polymerizer belt and is compressed and put on a belt system which takes it out of the water seal, through a washing spray and to a receiver. To remove traces of catalyst, the material is then steamed out in a chamber about 3 meters square and 2 meters high.

The steamed product is next taken to riffle rolls (like rubber washing mills) where it is washed and compressed somewhat. The washed material is then compressed on water-cooled polishing rolls which make a sheet 40 cm. wide and 4-7 mm. thick. These sheets are dusted with talc and fed to a continuous horizontal wire belt dryer. The dryer is 90 cm. wide and about 30 meters long. Air steam-heated to 120° C. enters the discharge end and leaves the feed end at 40° C. The product takes about 20 min. to go through the dryer, passing to an aluminum cooling band where it is cooled to room temperature. The sheet is here slit into lengths 1.5 meters long and packed into paper bags.

An interesting feature of the Oppau plant equipment is an air sampling device which continuously measures the propane content of air by infrared absorption, sounding a signal when concentrations reach explosive or physiologically unpleasant levels.

USES OF POLYVINYL ETHERS[3]

The methyl polymer is soluble in water and is used in adhesives and sizings for textiles, and in limited amount in polyvinyl chloride lacquers, up to 25 parts per 100. It is compatible with latex, cellulose nitrate, chlorinated rubber, cellulose butyrate and chlorinated polyvinyl chloride. It is added to rubber latex to aid in coagulation in making dipped articles.

The ethyl polymer is insoluble in water, soluble in alcohols, ethers, esters, and hydrocarbons. It is used in adhesives and lacquers. It has limited compatibility with cellulose nitrate and sweats out like castor oil. It is compatible with cyclohexanone resins, shellac, polystyrene, phenolic resins, chlorinated hydrocarbons, paraffins, and bitumen.

The isobutyl ether is insoluble in water, but soluble in alcohols, ethers, esters, and hydrocarbons. It is used in adhesives and lacquers. It is not compatible with cellulose nitrate or shellac, but is compatible with rosin-glycerol-maleic resin, cyclohexanone resin, polystyrene, paraffin bitumen, and rosin. So-called Igevin Oils, consisting of vinyl isobutyl ether polymer of K-values 20 and 30, are used as liquors for processing leather for waterproofing and maintaining flexibility.

The octadecyl ether has a softening point of 52° C. Its main application is in high grade shoe polish and creams. It is also used as a lubricant for extruding tubes from polyvinyl chloride when very hard material is required.

Three polymers were produced from vinyl tetrahydro-beta-naphthyl (beta-decalol) ether. The 100 per cent beta-decalol derivative (Igevin Z) and the copolymer made with 60 parts beta-decalol and 40 parts isobutyl ether (Igevin ZI) are hard resins used as components in adhesives and soft plastics. They have good solubility in usual solvents and good miscibility with plasticizers and oils. They are compatible with rubber, natural resins, bitumen, paraffin wax, and other polyvinyl ethers, but not with shellac. The softening points are 65-70° C. for Igevin Z and 70-75° C. for Igevin ZI.

The higher softening point resin is also used as a thickener for oils for insulating purposes and high-frequency cables. They are not used as thickeners for general purposes. The resins themselves are brittle and have a molecular weight of 3000-4000.

A copolymer made with 80 parts beta-decalol and 20 parts isobutyl ether (Igevin IZR) was designed for use as a washable distemper. It is worked into an emulsion for this purpose, but it was stated to be not as good as oil-bound distemper for weather resistance. It remains streaky and was only used for inside decorative purposes because of bad weathering resistance.

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* Fikentscher's viscosity coefficient, k, is calculated as follows:

$$\frac{\log R}{c} = \frac{75\,k^2}{1 + 1.5\,kc} + k$$

where c is the concentration in g./100 cc. of solution and R is the ratio of the viscosity of the solution to that of the pure solvent. The K values are 1000 times the calculated viscosity coefficient.

No. 12 of a series on
INFORMATION SOURCES FOR CHEMICAL MARKET RESEARCH

STATISTICAL ANALYSIS AND INTERPRETATION of Chemical Market Research Data

by ERNEST H. JURKAT*

CHEMICAL MARKET RESEARCH IS DIFFERENT. Basic principles apply, but they must be tempered by a knowledge of the peculiar characteristics of the industry and its products, some of which can knock certain standard market evaluation methods into a cocked hat.

AN INDUSTRY like the chemical industry, which by constantly questioning its own fundamentals continues to open new avenues to product and process conceptions, and which at the same time does not hold on to old products or processes when it finds new ones, must be more than any other in need of market research and analysis.

It is inevitable that situations constantly arise which call for new orientation. No market position can be taken for granted. It might be destroyed, sometimes over night, by new process developments that upset established cost-price relationships, or by the introduction of new products that are better or cheaper, or both.

The attack being the best defense, companies often have to make obsolete their own products and processes when laboratory developments become ripe for the plant. By doing it, they cause changes in established market potentials which usually vary with price and technical qualities. Where entirely new products create heretofore non-existing uses, market potentials for these new uses cannot be evaluated in the light of any past experience.

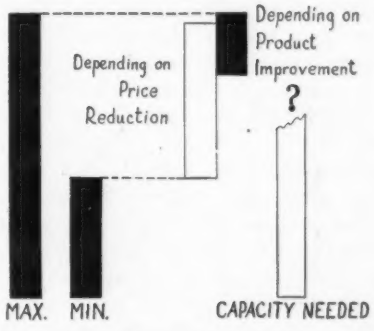
A CHALLENGE TO STATISTICAL ANALYSIS

Another characteristic of the chemical industry is the generative character of its processes which almost always produce more than one thing. Processes which yield several things produce at the same time several market problems which are interrelated with each other. Market decisions for any industrial chemical are a multi-dimensional affair.

But if the requirements of the chemical industry offer a great opportunity for market analysis, they also present it with one of its greatest challenges. Most chemicals are industrial goods, which means that they are sold to other industries for further processing rather than directly to the consumer. This fact should facilitate the task of the market analyst by limiting the universe in which the market potential for a given product is to be determined.

FIG. 1

The forecast of the maximum annual sales of X is 47,000,000 pounds or nearly as much as wartime production.



The minimum figure is 42.5% of the maximum. The capacity needed would lie somewhere between the maximum and the minimum.

It should, however, not be overlooked that the chemical process industries, which are the main market for the chemical manufacturing industries, represent in a peacetime economy and in terms of sales as much as about 20% of all manufacturing industry. Besides that, they are very dissimilar and cover a wide range of uses and quality relationships between specific industrial chemicals and size of operation of the processor. Statistical analysis and interpretations for the purpose of determining the contours of the market potential, designing a survey sample covering the space within the contours, and finally estimating the potential from the sample after its investigation and in conjunction with all other available pertinent statistics, thus becomes a major and very intricate undertaking, even in the simple case of an old and well known product. It is especially complicated where the chemical is either entirely new or is going into new markets.

INTERVIEW SURVEYS

Market research for industrial chemicals in so many cases has to deal with products for which no record of past marketing experience exists. Many times even the uses of the product are not fully known. Potential customers not only have to be told that it is available but also, very frequently, how they can use it in their operations. Uses of chemicals are not always self-evident, even to trained chemists. For this reason the question is often raised whether statistical analysis in chemical market research has to dispense with one of the most important sources of quantitative information in most market research projects: the data collected in interview surveys.

It is asserted that the "depth" interview has to replace the standard interview. The "depth" interview certainly produces much information on possible use and quality requirements. Its findings are of interest particularly to the laboratory and the advertising department. Since, however, it is usually conducted in a free manner, it cannot be tabulated most of the time, and quantitative expressions cannot be derived for the facts investigated. Consequently, it is not possible to establish measurable relationship between the data of the "depth" interview and other quantitative

* Wroe Alderson, Simon & Sessions, marketing and management counsel, Philadelphia, Pa., and Graduate School for Business Administration, New York University.

FIGURE II

RELATION BETWEEN EMPLOYMENT RATE AND PERCENT PRODUCTION

EMPLOYMENT RATE

industry data and thus provide the basis for estimates of present and future market potentials. This means that the conclusions derived from "depth" interviews are of little use when management has to take cost-price relationships into account. For this purpose, numerical expressions are needed, both for market potentials and for the effect on them of changes in price, quality and sales effort.

MUST GET DATA

As long as the statistical market analyst does not find ways and means to obtain from standard interviews the kind of data he needs, his relationships with management cannot be expected to be very happy. If, however, he succeds in developing a basis for standard interviews which meet his requirements, market research methods can be advanced and refined beyond their present standards.

Methods of statistical analysis will also derive much inspiration from their application to data on production and consumption of industrial chemicals for the purpose of forecasting future production and consumption from past trends and trend relationships. The highly dynamic character of the market position of industrial chemicals which finds its expression in high rates of growth and in secular price trends, adds new factors to those usually taken into account in traditional forecasts.

SAMPLE DESIGN

For purposes of general orientation, valuable information on the relative position of an individual company and on the future prospects for an industry and its companies can be derived from traditional figures for quantity and value of production over a period of time and under various business conditions. If, however, the relative market position of an industry or an individual company with regard to different user groups is to be appraised, figures on consumption of a given product or product group according to industrial consumer groups have to be developed. Since data on actual consumption are not available at frequent intervals, relationships between consumption and production in years for which both types of data are given are used for computing consumption in other years where production only is reported. These statistical estimates, in turn, lose their usefulness if the market prospects for new uses or new chemicals are to be evaluated. Relationship between the expected consumption of the new product and some indicator for the activity of the consuming group, preferably value of production or sales, then have to be developed on the basis of original investigation which usually starts out with a sample of the consuming industry.

There are several steps involved in the determination of a market "universe," that is, the determination of the possible consuming groups for which samples have to be designed. The four principal standard procedures which find application in most industrial market research projects are a study of pertinent inter-industry relationships on the basis of census and other statistics, an analysis of the company's own sales records, an extensive survey and an intensive engineering exploration in strategic companies of potential consumer groups. The extensive survey has to cover every industry group which can be thought of as a potential consumer. It is confined to a few questions on actual and possible use of the product. It will not always be too helpful where the chemical for which the market has to be explored is not known either by name or by performance. In this case intensive (or "depth") interviews, the distribution of which has to be guided by an analysis of available statistics on variations in kind and quality of products and production unit sizes,

will prove a more useful tool. Their main objectives will be to identify materials that can be replaced by the new chemical, determine quantity relationships between substituting and substituted materials, and find entirely new uses and ways of measuring quantities required for new uses.

If intensive survey and statistical analysis of the structure of the universe favors the use of random sample procedures, the question has to be raised whether the traditional sampling theory provides the proper basis for decisions on sample size. In most instances, especially if special samples are designed for the various sectors of the universe, the assumption cannot be made that the sample is drawn from an infinite universe.

SAMPLING ERRORS

There are not many industry groups where the number of establishments exceeds a thousand and very few close to ten thousand units. Mathematical statisticians have not yet concerned themselves with sampling errors in such a small and finite universe. This is not the place to deal with problems of general sampling theory which are not of immediate importance to the statistical analysis and interpretation of market research data. It should, however, be emphasized, that without a theory on sampling errors in a small and finite universe and without expressions for the variance in different percentage sizes of samples, sampling in industrial market research lacks its theoretical foundation as well as its practical guidance.*

Rather than to design a random sample, either for the total universe or for the industrial groups which represent its sectors, it very often will be more expedient and sometimes even necessary to apply another procedure which has been referred to as contour sampling. Even if the principle is adopted that the sample units should be plants instead of companies, some of the individual plants might be so unique in character and size that no sample which excluded them could be considered representative. It might also be more important to increase the reliability of the basis on which ratios between the consumption of industrial chemicals and the value of the consumers' production are established than to adhere to the mechanical conception of a small scale model of the universe.

If, for instance, significant variations of consumption ratios with company sizes in an industry group are suspected or traced, adequate data should be obtained to establish plotting points for specific sizes. From a curve fitted to these data, estimates can be made for the size groups between plotting points and the overall result will be more reliable than from an overall random sample in which none of the variations are adequately represented. The same procedure can be applied where consumption ratios vary with the quality and the composition of the products the consumer is manufacturing himself. Since the subsamples from which the plotting points are derived are in turn of the random variety, the need of a sampling theory for the small and finite universe becomes still more evident.

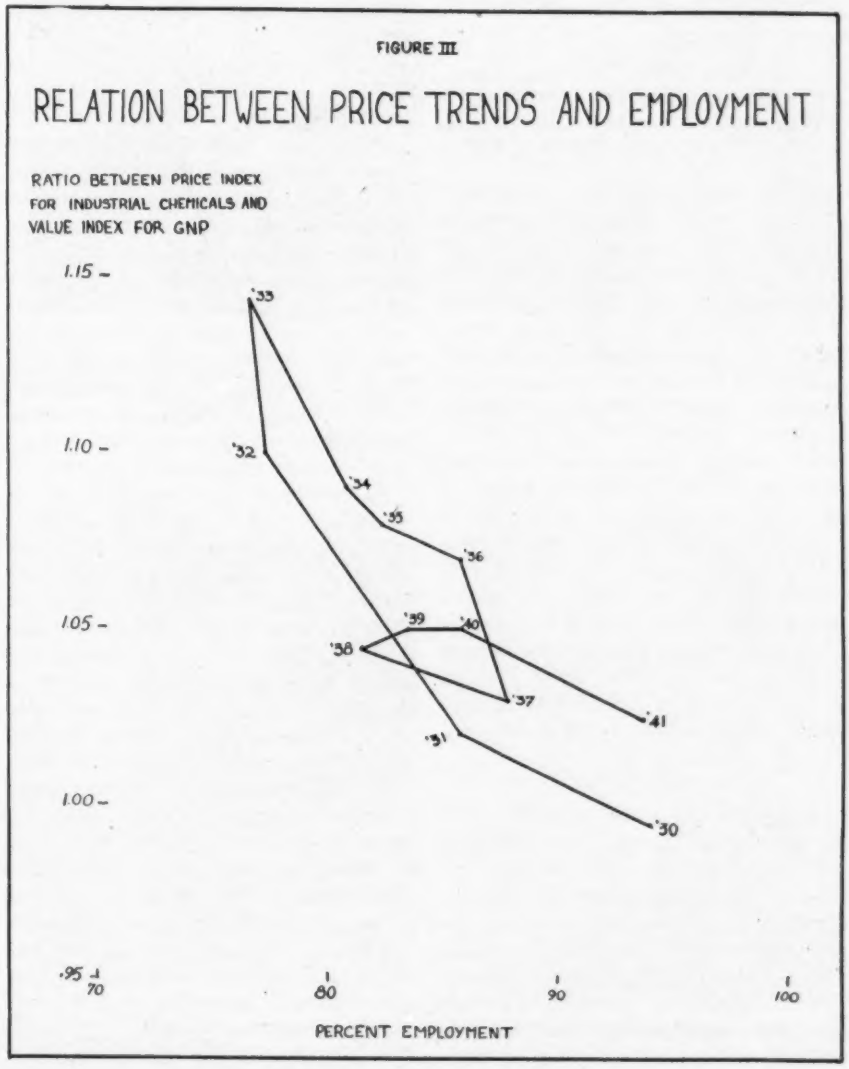
MARKET ESTIMATES

Management which must think in terms of profit has to be presented with estimates of market potentials that are related to factors affecting profit. Figures for market potentials for industrial chemicals by consumer groups are of extreme interest. They assume specific significance if their dependence on, and variation with, price, technical qualities of the product, and sales effort, are stated in form of quantitative expressions. This means that more than one set of ratios between consumption of industrial chemicals and production of the consuming industries have to be established.

As far as price is concerned, ratios in the case of a maximum price and at least a minimum price—which is the price for which all potential consumers would buy the product—have to be computed. Usually, it will even be necessary also to determine intermediate ratios, if the variation between ratios and prices is expected to assume the nature of a curve. The alternate market potential estimates related to different degrees of technical improvements have to be based on an investigation of the typical quality requirements of consumers and on ratios between consumption and production of the consumers. There are again at least two ratios to be computed, the smallest one on the assumption that minimum quality requirements are met, and one on the assumption that all quality requirements can be met.

If the industrial chemical is an entirely new product or a product that has found its market in war production exclusively —in which case it is a new product to all consumers who were not engaged in war production—the computation of the mentioned ratios has to be preceded by the conversion of quantities of products that are likely to be replaced by the new chemical into quantities of the new chemical. If all the necessary ratios are established, projections of the market potentials for the various consumer groups are

FIGURE III



* Sampling distributions in the case of a small and finite universe have been worked out by Wroe Alderson and will soon be published.

easily made. They are simple if the survey covered a sample group of companies which constituted a small scale model of the consumer groups. In the case of contour sampling, ratios for the intermediate groups between those for which random samples were investigated have to be estimated before the final projections can be executed.

The estimates for minimum and maximum market potentials developed under different assumptions for prices and technical improvements can be consolidated into over-all estimates for minimum and maximum market potentials. The increases in market potentials caused by price concessions and those caused by technical improvements usually do not add up to the difference between the over-all minimum and maximum market potentials. They are partly overlapping. In some consumer groups it will take both price concession and technical improvements to raise the volume of consumption above the minimum. For the purpose of illustration, estimates of the minimum and maximum market potential for an industrial chemical X, that had found use in war production, are presented in table and graph form. (Figure I).

MARKET POTENTIAL FOR PRODUCT X

Minimum Market Potential	20,000,000 lbs.
Increase in Market Potential if unit price is 10¢	25,000,000 lbs.
Increase in Market Potential if typical quality requirements are met*	10,000,000 lbs.
Maximum Market Potential ...	47,000,000 lbs.

* Complete listing of quality requirements (as for instance, water soluble property, flexibility, etc.).

It is difficult to relate market potentials to sales effort and its various elements in the same direct way in which they can be related to price concessions and technical improvements. Elements of sales effort have to be substituted by factors which give some indication of the kind and cost of the sales effort required. An important factor in marketing industrial chemicals frequently is the degree to which potential customers are acquainted with the product and its properties. It is, therefore, useful to develop tables which show how much of the minimum and maximum market potential is with consumers who have used the chemical and who have experimented with it, who know about it and who have heard about it. It is also helpful to identify market potentials not only by consumer groups but also by geographical regions and uses.

FORECASTS

In most instances, the principle applied in forecasting markets for industrial chemicals is basically identical with that followed in estimating market potentials. Original figures for consumption by industry groups are very rarely available for a period of time covering different business conditions. There is, therefore, very little opportunity for directly projecting purchases against whatever number of independent variables, like Gross National Product, etc., is required for a good projection. Almost always available, however, are figures for production or sales of the consuming groups. If these in turn are forecast and ratios between consumption of chemicals and production or sales of consumers are applied to the projected values for production or sales, fairly useful estimates of future markets can be obtained. Their deficiency is that they do not take secular trends in the employed ratios into account. It is possible to make some allowance for such secular trends if ratios between consumption of chemicals or the products they are replacing and production of consuming groups have been worked out for a number of census years or if such ratios can be derived from surveys. This is difficult to do, however, and in the case of new chemicals creating new uses it cannot be done either on the basis of census figures or of figures derived from special surveys.

NEXT MONTH

No. 12 of the series on Chemical Market Research will be on the subject of preparation and presentation of market research reports. It will be by Robert E. Sessions of the firm of Wroe Alderson, Simon & Sessions.

Forecasts of markets, that is, of purchases and consumption, respectively, can be matched with forecasts of sales by chemical producers. Such forecasts can either be based on relationships between sales of chemicals, which have the nature of supplies, and such business indices with which the sales of chemicals are correlated in time or they can follow, at least in principle, the forecasting procedures which are using the estimating equations of simple or multiple correlations between simultaneous factors.

In the case of most industries, the introduction of two independent variables into the estimating equation for simultaneous factors is sufficient. They are Gross National Product and Employment Rate. The introduction of the Employment Rate, that is, the number of employed people as a percentage of the labor force, is particularly necessary wherever sales as a percentage of Gross National Product vary with the Employment Rate. Since the Gross National Product under comparable employment conditions is growing with the continuing increase of the labor force and the productivity of labor, identical figures for the size of Gross National Product at time intervals are bound to represent two different employment rates and hence two different ratios between sales of a given product and Gross National Product.

Forecasters who have not recognized this fact have tried to explain the higher or lower volume of sales for the same Gross National Product in a later year by the assumption of a secular trend.* But in most instances, the mere introduction of the employment rate will be sufficient to reduce to proper proportions the error of estimation that would result from an estimating equation using Gross National Product only as an independent variable.

Such a restriction, however, is not permissible in the overall projection of industrial chemicals. It has to take into account a strong secular trend which becomes evident from Figure II, where, for purposes of demonstration by comparison, the values of construction and of industrial chemicals, both taken as a percentage of Gross National Product, are plotted against the Employment Rate.

Another factor further complicating the projection of production values of industrial chemicals is the comparatively strong price resistance of the latter in periods of depression, resulting in a negative correlation with the Employment Rate of the ratios between price indices for industrial chemicals and real value indices for Gross National Product (see Figure III). If this complication is eliminated by expressing values for production and Gross National Product in dollars of a basic year, the estimating equation used in the projection of industrial chemicals will assume the form

$$X_{c1.234} = a_{1.234} + b_{12.34}X_2 + b_{13.24}X_3 + b_{14.23}X_4.$$

In this equation† X_1 represents the production of industrial chemicals which is forecast, X_2 represents Gross National Product, X_3 the Employment Rate, and X_4 the year for which the forecast is made. It is, of course, understood that the use of this equation depends on the possibility of forecasting Gross National Product and Employment Rate for the year for which the estimate of chemical production is required. But this statistical problem is not limited to market research dealing specifically with industrial chemicals. It is shared by all market research.

* This assumption is made by the Department of Commerce, which developed this type of forecast in its initial forms.

† This is an equation for estimating the production or sales of Industrial Chemicals (X_1) from Gross National Product (X_2), Employment Rate (X_3) and Time (X_4, which for instance in 1948 would be 19 if 1929 is 0). It is adapted from an estimating equation presented by Croxton and Cowden in their text "Applied General Statistics," New York, 1943, pp. 741, 742. The "c" attached to the X_1 on the left hand side of the equation stands for "computed," meaning that the obtained expression for Industrial Chemicals is not an observed but a computed value. The "b's" are what is called the "net coefficients of estimation." They indicate the effect on X_1 (Industrial Chemicals) of a change in the accompanying independent variable when allowance has been made for the other independent variables. Thus, $b_{12.34}$ is an estimate of the variation in Industrial Chemicals with a variation in Gross National Product, independent of variation of Employment Rate or Time. The other "b" coefficients in the equation are interpreted analogously, the figures to the right of the decimal point in the subscript indicating the factors that are held constant. The constant $a_{1.234}$ is the hypothetical value for Industrial Chemicals when the other factors considered have a value of zero. If X_{c1} stands for the production of Industrial Chemicals, $a_{1.234}$ should be zero, if the Employment Rate is zero.

HEADLINERS in the NEWS

GEORGE B. KISTIAKOWSKY, professor of chemistry at Harvard University, awarded the William H. Nichols Medal of the New York Section of the ACS for 1947.

ROBERT H. WILLIAMS, director of research, Research Corp., awarded the 1946 Perkin Medal for his fundamental work on Vitamin B_1, or thiamine, which he synthesized.

CHARLES J. MIGHTON, named laboratory manager of Du Pont's new Akron Laboratories. He was research supervisor at the company's Experimental Station.

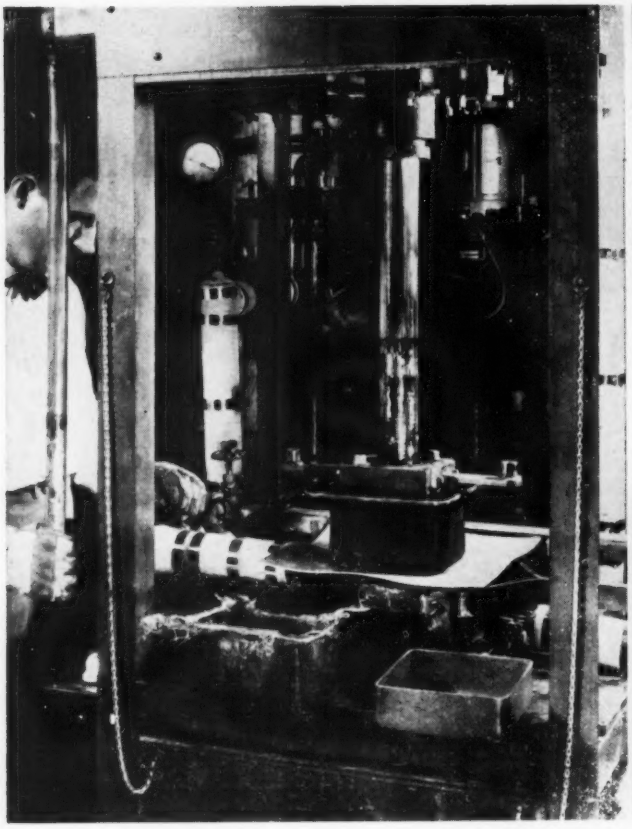
HUBERT R. SNOKE, appointed chief of the Bituminous and Detergent Section of the National Bureau of Standards. He is an authority on bituminous products.

F. P. SCHNEIDER, elected president and general manager of the Velsicol Corp. He has been secretary and treasurer of this company since its founding in 1931.

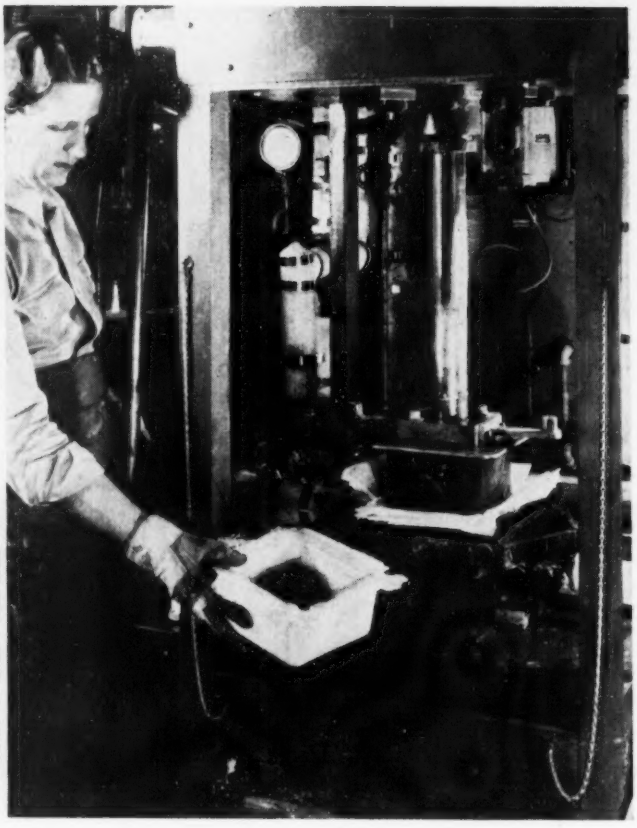
CLIFTON S. THOMSON, elected director and general counsel of Ciba Pharmaceutical Products, Inc., New York. He is also a director of United Dyewood Corp.

G. GILBERT THORNE, appointed general sales manager of Sherwin-Williams Special Products Div. He joined this company recently coming from Montgomery Ward Co.

ERNEST R. DURRER, elected executive vice-president and director of Givaudan-Delawanna, Inc. and Burton T. Bush, Inc. Mr. Durrer is a native of Switzerland.



An experimental plunger press forming a thermoplastic sheet between a heated metal mold and a solid neoprene plug. Left foreground is the shape as it comes from the press.

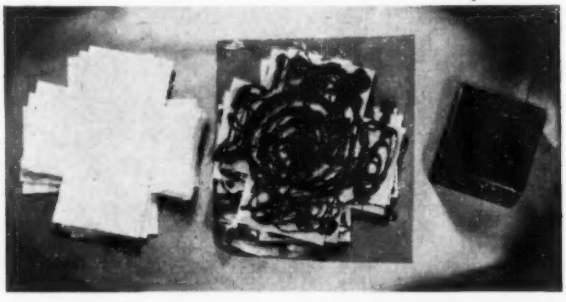


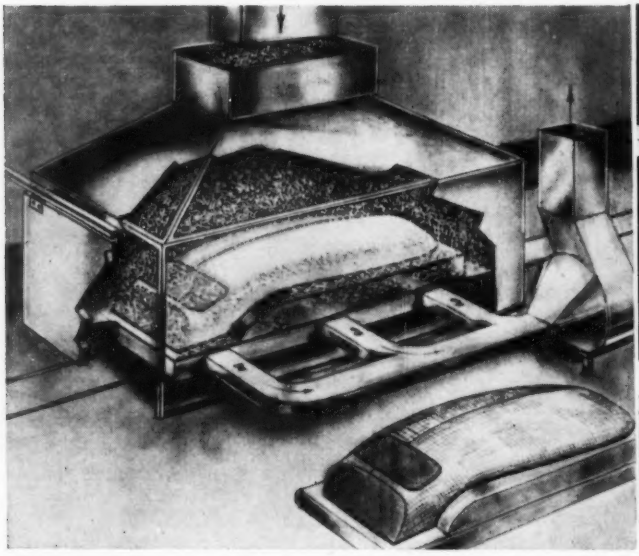
Fiberglas reinforced parts are formed from plies of Fiberglas mat. The neoprene plug is shaped to contact the bottom-center first, then to expand up the sides to squeeze out air and excess resin.

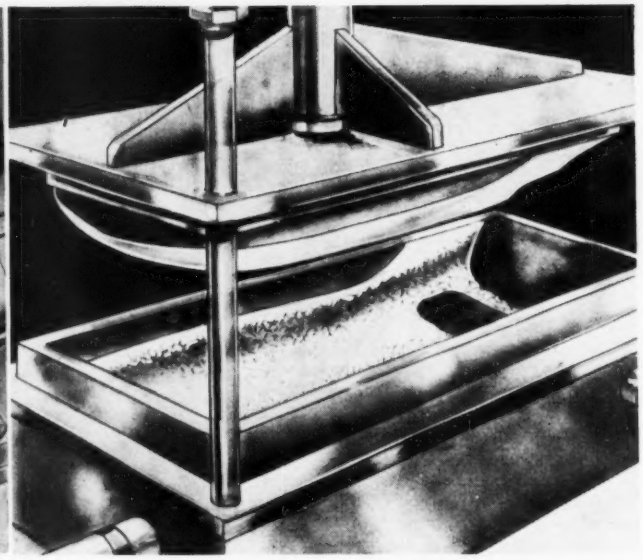
Novel Pre-form Process

Production clinics are being held by the Owens-Corning Fiberglas Corp., for resin producers, laminators and fabricators with the purpose of obtaining suggestions and criticisms on an experimental production process for making Fiberglas reinforced plastic parts. Now in the development stage, it is visualized that the steps pictured here may ultimately be applied to fully automatic, assembly-line production of such automobile body elements.

Right, steps in making a box are: pre-cut Fiberglas mats; plies of mat laid up with the resin poured on; and, the finished article.







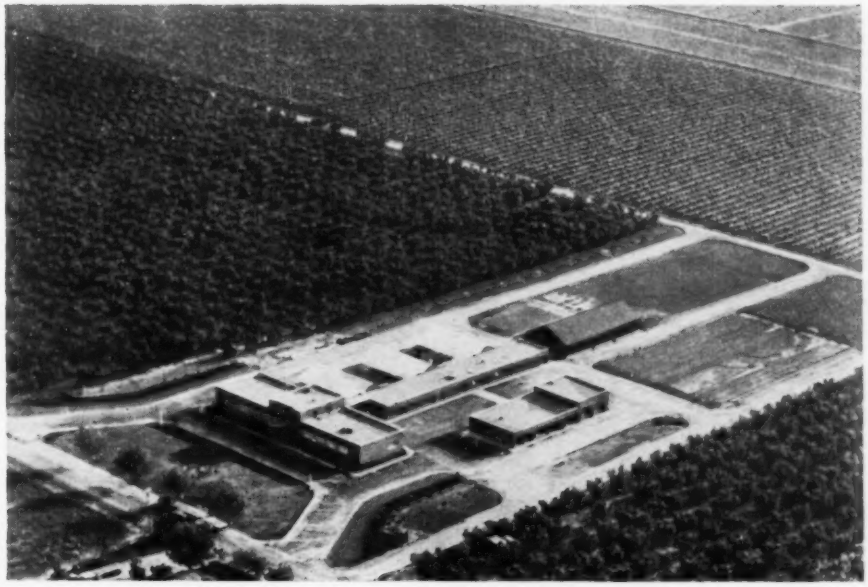
Above is a proposed system for making pre-form mats for auto body sections. At the left textile-type glass fibers up to two inches long are coated with resin and drawn by vacuum onto a perforated metal form of the desired shape. At the right is a plunger press where the lightly bonded pre-form is saturated with resin and molded between a neoprene plug and metal mold.

On the Shell farm nitrogen for plant growth is metered out of cylinders, in the form of ammonia, and fed directly into irrigation ditches.

New Farm Laboratory

Occupying 142 acres in the heart of California's rich San Joaquim Valley near Modesto, the Shell Oil Company's new agricultural laboratory is engaged in developing chemical derivatives of petroleum which will further reduce the farmer's losses from pests and plant diseases. The facilities include laboratories for studies in the fields of entomology, nematology, horticulture, plant physiology and pathology. The site was chosen because its soil and climate provide normal growing conditions for virtually all pests and crops; laboratory facilities, moreover, make it possible to duplicate artificially any desired climatic conditions. In addition to its technical research and development, the laboratory will provide a scientific library, conference rooms and an auditorium for collaboration with agricultural colleges.

The laboratory has a technical staff of 30. Horticulturist F. B. Herbert (above) checks the growth of a young pear tree, while pathologist E. W. Bodine (below) removes sterilized barley from an autoclave preparatory to conducting tests on plant diseases.

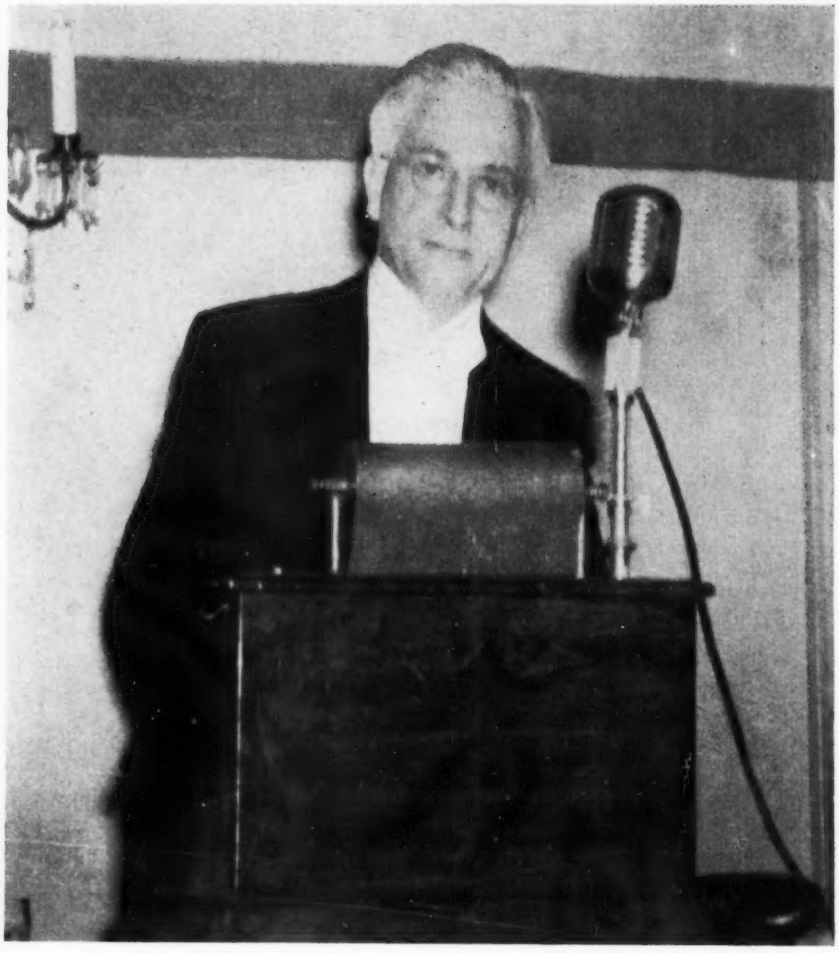


The half million dollar layout has 100 acres of commercial trees and vines, 30 acres of truck crops, and complete greenhouse, laboratory, auditorium and service buildings.

Willard Dow Receives SCI Medal

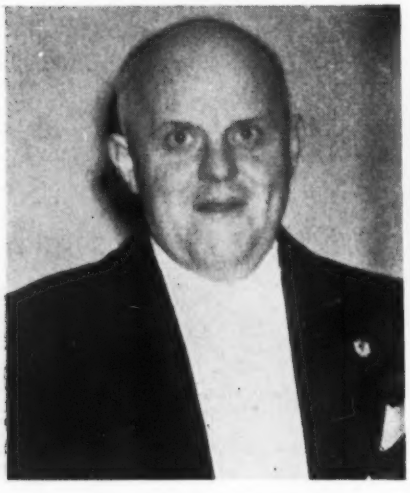
In awarding its Chemical Industry Medal to Willard H. Dow, president and chairman of the board of Dow Chemical Company, the American Section of the Society of Chemical Industry recognizes the outstanding contributions of one of America's foremost scientist-industrialists.

This most recent award takes its place among the other distinguished honors Dr. Dow has received in the past; honorary doctors degrees from the Michigan College of Mining and Technology, the University of Michigan, and the Illinois Institute of Technology; the Chandler Medal from Columbia University; and, the Gold Medal Award of the American Institute of Chemists.



In accepting the SCI Medal Dr. Dow said, " . . . perhaps we have dealt too much and too long on success in terms of the dollar—too little in terms of the humanities. We have judged the merit of a company by the extent of its physical assets rather than by the number of human beings with which its operations provide the comforts of life—by the magnitude of its sales rather than by the degree to which its products have made life finer and fuller."

Francis J. Curtis (above), Monsanto Chemical Co., made the medal presentation; and S. D. Kirkpatrick, chairman of the American Section of the SCI, acted as chairman of the award meeting.



William J. Hale (left), chemical consultant of the Dow Chemical Co., and long time friend and associate of Dr. Dow, addressed the SCI group on the "Personal Side of the Medalist." Maj. Gen. Alden H. Waitt (right), Chemical Corps, USA, speaking on the scientific side of the medalist, lauded the Dow Company's great industrial and wartime achievements.

MONSANTO

Plasticizers

sulfonamide type

what

where

why

how

Monsanto Sulfonamide-type plasticizers vary in form from crystalline solids to oily liquids. They are widely compatible and are especially useful where the ordinary plasticizers cannot be used. They are excellent solvents for many dyes and resins.

These plasticizers have been used to plasticize cellulose acetate, cellulose nitrate, cellulose acetate butyrate, cellulose acetate propionate, ethyl cellulose, soy-bean protein, casein, urea formaldehyde, phenol formaldehyde, shellac, and many others.

The Sulfonamide-type plasticizers should be used where it is desired to impart gloss, flexibility, moldability, or water resistance to films, foils, or molded items. They should also be used to introduce otherwise incompatible ingredients, such as plasticizers or dyes, into lacquers or molding compounds.

Samples, technical data, and availability information will be supplied upon request. Contact MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Cincinnati, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

MONSANTO CHEMICALS

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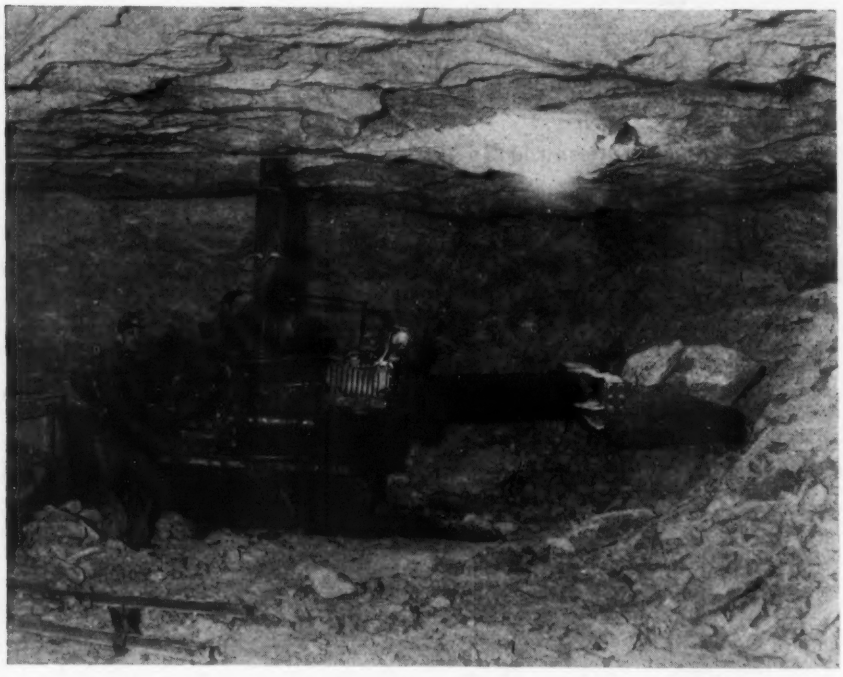
BETWEEN THE LINES

Freight Rate Increase Will Affect Chemical Industries

Chemical interests are likely to be among those most seriously affected if the pending application for rail freight increases is approved by the Interstate Commerce Commission.

MANY relationships in the chemical field are involved in the outcome of the pending application by the railroads for increased commodity rates and the indication that a corresponding move by water carriers may be in the offing.

A sufficient number of large chemical producers have expressed themselves on the matter to provide a reasonably representative cross section of opinion in the industry.



New Mexico potash: will freight rate increases upset the balance in a delicately adjusted industry?

In the fertilizer business, as one example, it is fundamental that the product reach the farm consumer without too many added costs. Any radical upset in the freight rate structure would have a serious effect on the postwar fertilizer industry. It is a fair speculation that the prewar ration of fertilizer consumption in the South to that in the more prosperous Midwest might have been different if the cost of distribution had been different.

There is also the problem which the fertilizer industry faces internally. Quite apart from the more than 13,000,000 tons of fertilizer consumed in 1945, which necessarily moved overland from factory to farm, is the vast tonnage of nitrogen, phosphoric acid, potash, and other materials that are compounded to form the finished product. These materials move from sources all over the country to the mixing plants.

In addition to upping overall costs, freight rate increases would confront some producers with entirely new competitive situations. Potash is an example. Domestic production of potash is about 1,500,000 tons a year, all of which must move by rail to consuming areas. Potash producers in California compete primarily with production in New Mexico, and to a lesser degree with production in Utah, for a market about 80 per cent of which is along the Atlantic and Gulf seaboards.

Thus without considering at all the potential resumption of potash shipments from abroad, the pending rate proposals would seriously affect the internal relationships of this industry. The current balance was effected and existing rates established only after comprehensive studies by the Interstate Commerce Commission covering some five years, and after a number of rate cases involving various railroads.

A petroleum coke producer points out that "any increase whatever in rates on petroleum coke will make it more difficult to sell in locations where natural gas is available . . ."

In the case of carbon electrodes, one producer particularly cautioned the I. C. C. against any action "which will disturb present competitive relationships" in this industry, other than those that would normally result from so-called "percentage" increases, as against flat amounts.

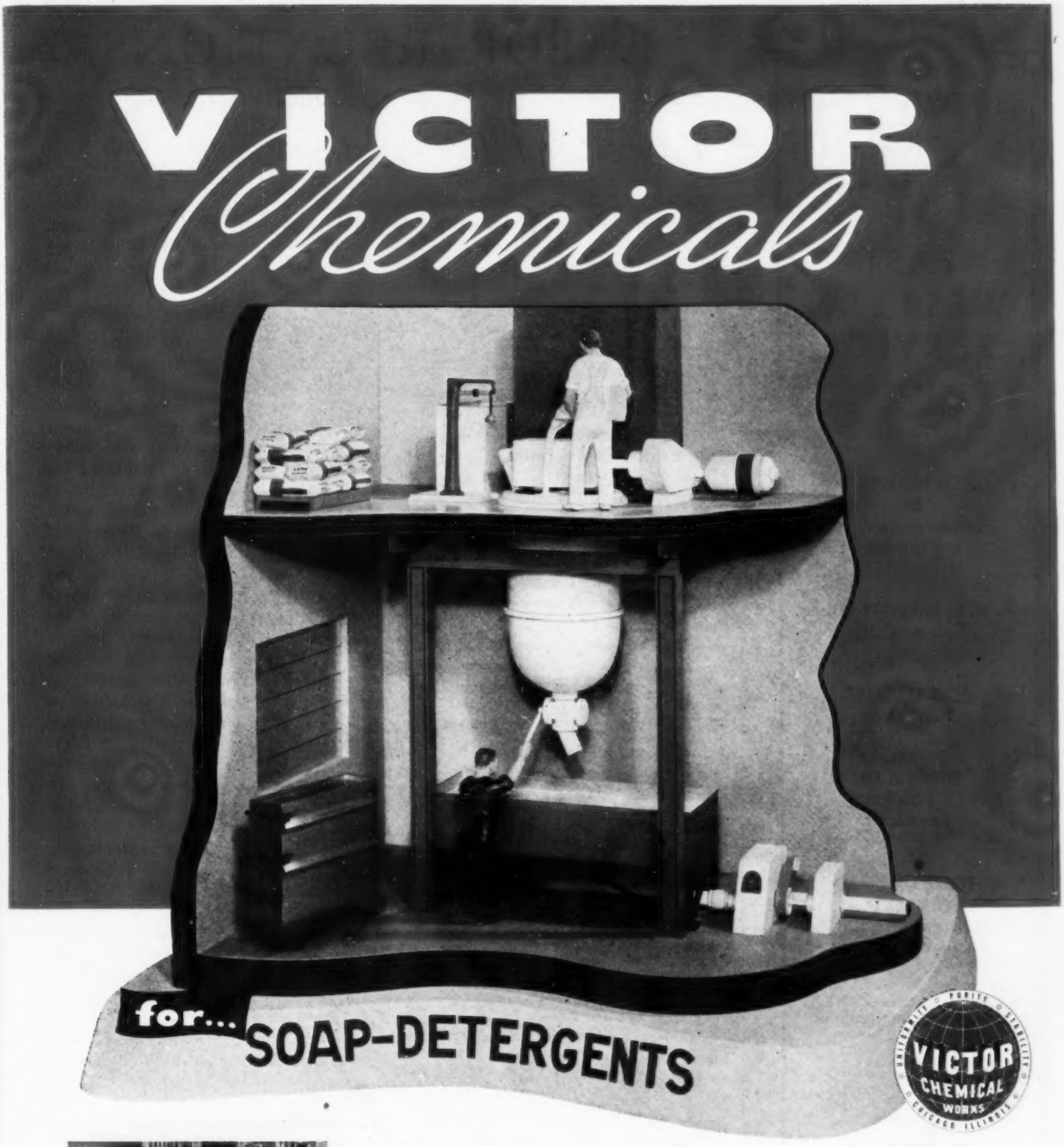
Perlite rock is a case illustrating the position of a new industry. In a new expanded form this mineral is expected to have uses as an insulating material that would be competitive with expanded slag or rock. Commercially usable deposits of perlite are believed to be largely confined to the Pacific Coast mountain areas; it is now being quarried at two points in Arizona. The producers point out that the expanded material has not been made heretofore in substantial quantities commercially, that it is a new venture which may lead to new plants being built at other points in the United States. They report, in fact, that they are already preparing an analysis to determine just where to locate their next new plant. They are extremely interested in any freight rate increase which would alter the position of this western product.

Touching briefly a similar situation, Permanente Metals Corp., one of the three producers of primary aluminum in the United States, has leased three plants which constitute a substantial part of the postwar aluminum production capacity in the Northwest. The company has recently entered a protest to the Interstate Commerce Commission with respect to the freight rate increase proposals. Without using the language of the Permanente brief, it can be construed broadly as pointing out to the Government that what was conceived in Washington as a nicely-balanced competitive aluminum industry postwar, is threatened at the start if the rate increases are allowed to become operative.

Without going into the merits of the situation, an aluminum industry in the Northwest that must ship its aluminum products back east by rail has an evident problem in meeting both older producers and other postwar operators more advantageously located.

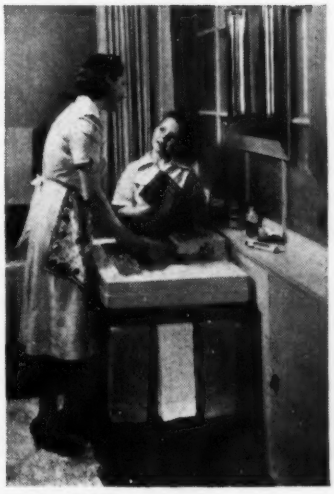
It should be stated that many of the producers whose dilemmas are touched on here have taken a sympathetic view of the railroads' rate plea in general, and have sought to narrow their objections in such a way as to leave the greatest scope for Commission approval of the requested increases.

VICTOR Chemicals



for... SOAP-DETERGENTS

VICTOR CHEMICAL WORKS



Difficulties encountered in washing with hard water have prompted the widespread use of special water-softening and soap building chemicals. Soaps containing Victor tetrasodium pyrophosphate, for example, yield more suds and a cleaner, sweeter smelling wash. The pyrophosphate sequesters magnesium and prevents the formation of magnesium soaps, while simultaneously peptizing the curds of calcium soaps so they do not become enmeshed in the fabric. It also has a marked solvent action on organic materials such as gums and waxes, and loosens and disperses solid particles of dirt. • Other Victor chemicals used in the manufacture of soap and detergents include: **Sodium Tripolyphosphate** (cleaning compounds and bar soaps), **Tetrapotassium Pyrophosphate** (liquid soaps and washing compounds), **Tripotassium Phosphate** (liquid soaps), **Trisodium Phosphate** (cleaning compounds), **Wetting Agents** (cleaners and synthetic detergents).

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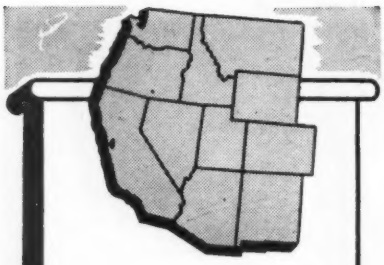

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LABOR RELATIONS

by NATHAN C. ROCKWOOD

Travel and Preparation Time

EMPLOYERS are learning that increasing labor costs are not all accounted for by rising wage rates. "Liberal" interpretations of "working time" by the administrator of the Fair Labor Standards Act (the so-called Wage and Hour Law) and by the courts are important factors also. They are in effect increasing rates of pay for time actually spent in production, and also they are adding a possibly great and unknown liability to employers for several years of past operation, for which there is no possibility of recovering the loss from the goods made and sold.

Last July the United Mine Workers served notice on E. I. du Pont de Nemours & Co. that it was demanding payment to workers at the company's Charleston, W. Va., plant for time spent walking on the plant property to the site of their actual work. The demand is for retroactive pay to cover the past eight years' operation. More recently the C. I. O. automobile workers' national headquarters has instructed its locals to begin employee suits to recover for travel and other "work preparation" time at many other plants in all kinds of industry, so that no employer of union labor is exempt from possible liability for practices that have been accepted as standard from time immemorial.

Based on Supreme Court Decisions

All this activity to further "nick" the innocent employer is based on two or three United States Supreme Court decisions, the first of which was in 1944, in the Tennessee Coal, Iron and Railroad Co. case, involving work time of iron ore miners. The court defined "work" as including: "Either physical or manual exertion, as it is required or controlled by the employer and is pursued necessarily and primarily for his benefit and business."

The practice followed by this employer is closely parallel to that in many industries where a labor shift is expected to begin productive work at a certain time and quit at a certain time, with a half hour, or an hour, off for lunch. The union contract read: "Eight hours' work per day shall constitute a day's work, and 40 hours shall constitute a week's work. The eight hours per day means eight hours of work at the usual working place, exclusive of the lunch period." The lower court held this provision had little weight because no precise time record was kept of the time spent "at the usual working place." The court also held that work time included "time spent on the surface in obtaining and returning mine lamps, carbide and tools, and in checking in and out."

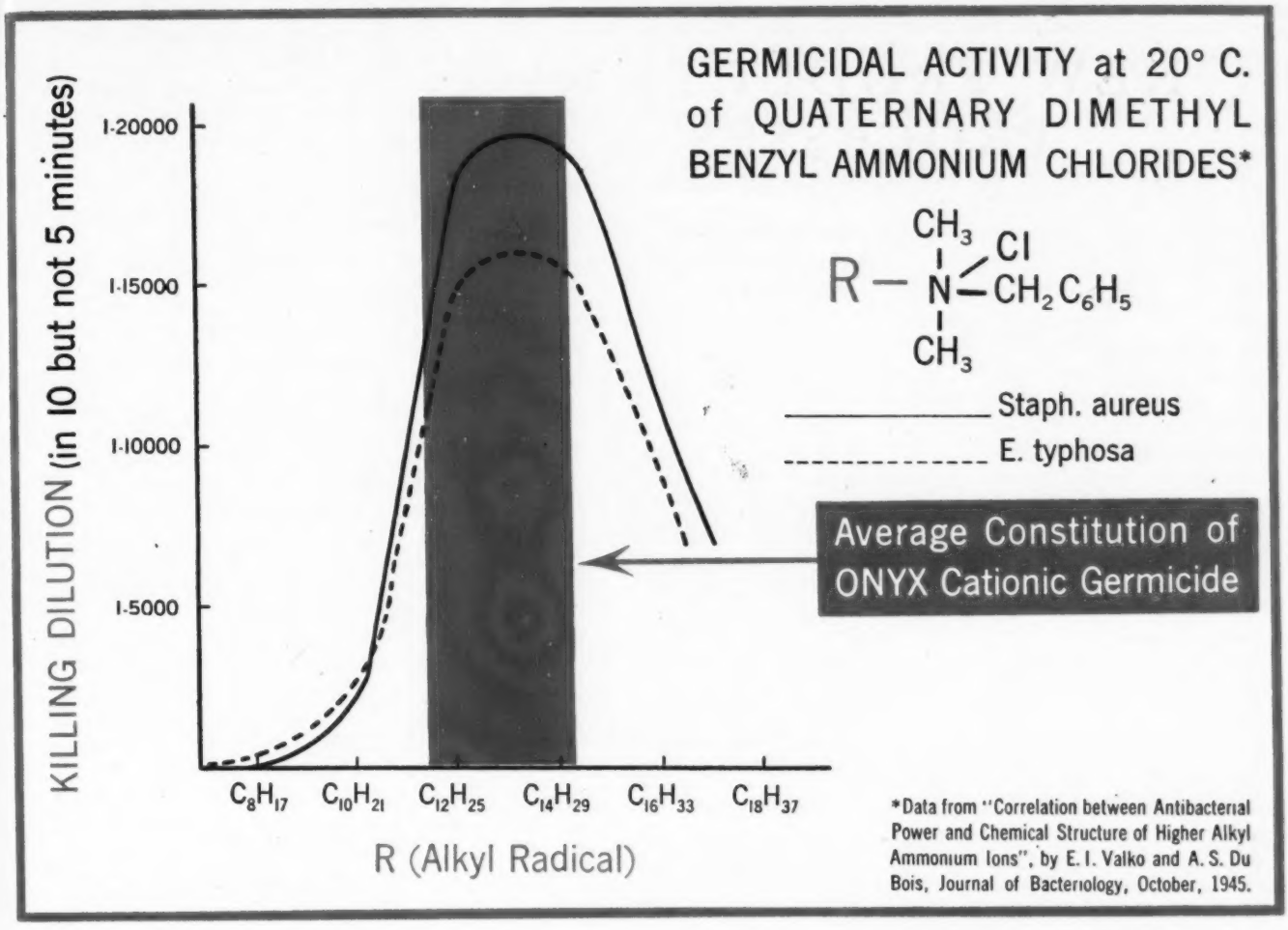
Famous Pottery Case

This doctrine was subsequently extended by the United States courts, including the Supreme Court, to coal mining and eventually to various other kinds of industry. The particular Supreme Court decision upon which the United Mine Workers (in the du Pont case) and the C. I. O. base their instructions to local unions is that handed down in the new famous Mt. Clemens Pottery Co. case, decided June 10, 1946. The point at issue was payment (back wages and penalties) for time spent by employees walking to work on the premises of the company, following punching of the time clocks, and the time spent in pursuing preliminary activities after arriving at their places of work such as putting on aprons and overalls, removing shirts, taping or greasing arms, putting on finger cots, preparing equipment for productive work, turning on switches for lights and machinery, opening windows, and assembling and sharpening tools.

The company employed approximately 1200 persons, 95 per cent of whom were on a piece-work basis. Working time was calculated on the basis of the time cards punched by the clocks. Compensable working time extended from the succeeding even quarter hour after employees punched in to the quarter hour immediately preceding the time they punched out. Thus an employee who punched in at 6:46 a.m., punched out at 12:14 p.m., in again at 12:46 p.m. and out at night at 4:14 p.m., was credited with having worked the eight hours between 7:00 a.m. and 12 p.m. and 1 p.m. and between 1 p.m. and 4 p.m.—a total of 56 minutes less than the time recorded by the time clock.

The employees did not prove that they were engaged in work from the moment when they punched in at the time clock to the moment when they punched out. They were required to be ready for work at their benches at scheduled starting times. They were given 14-minute periods in which to punch the time clocks, walk to places of work and prepare for productive labors. It would have been impossible for all the members of a particular shift to be checked in or out at a clock at the same time; with 200 using

(*Turn to page 1098*)


GERMICIDAL ACTIVITY at 20° C. of QUATERNARY DIMETHYL BENZYL AMMONIUM CHLORIDES*
KILLING DILUTION (in 10 but not 5 minutes)
1-20000
1-15000
1-10000
1-5000
C_8H_{17} $C_{10}H_{21}$ $C_{12}H_{25}$ $C_{14}H_{29}$ $C_{16}H_{33}$ $C_{18}H_{37}$
R (Alkyl Radical)
Staph. aureus
E. typhosa
Average Constitution of ONYX Cationic Germicide
*Data from "Correlation between Antibacterial Power and Chemical Structure of Higher Alkyl Ammonium Ions", by E. I. Valko and A. S. Du Bois, Journal of Bacteriology, October, 1945.

The R-Factor in Cationic Surface-Active Germicides

Maximum germicidal power is obtained in alkyl dimethyl benzyl ammonium chlorides when the alkyl radical (R) is in the range of $C_{12}H_{25}$ to $C_{14}H_{29}$. Here surface activity, wetting action, penetration and killing contact are most effective. In

ONYX CATIONIC GERMICIDE

ALKYL DIMETHYL BENZYL AMMONIUM CHLORIDE 50%

the alkyl radical is controlled within this range by careful fractionation during manufacture. The average molecular weight of this germicide is 350±5.

Dilution of the 50% concentrate to 10% gives a remarkably safe and powerful bactericide and fungicide. Killing action is fast and relatively non-selective. Solutions are stable, colorless, odorless, non-corrosive, non-irritating and non-sensitizing. At recommended dilutions they are non-toxic.

Look into Onyx Cationic Germicide as a potential profit builder.

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NEW PRODUCTS & PROCESSES

Isooctane NP 413

The availability in drum or tank car quantities of isooctane (2,2,4-trimethylpentane) of high purity has been announced by the Chemical Products Department, Phillips Petroleum Co.

Preliminary examination of production stream samples on the new isooctane product indicate the purity to be over 99.9 mol per cent. Some of the other properties are compared in the following tabulation:

	Pure Iso-octane (A.P.I. Research Project 44)	*ASTM Specification for Reference Fuel Grade Isooctane*		*Properties of Current Production (P.P.Co.)*
		Min.	*Max.*	
ASTM octane number	.....	99.9	100.1	99.96
Density at 68° F. (20° C.) g. per ml.	.69193	.6918	.6920	.6920
Freezing point, ° C.	—107.365	—107.52	....	—107.43
Boiling Point, ° F.	210.63	.....	.....	.....
Boiling Point, ° C.	99.237	.....	.....	.....
Distillation:				
Temp. at 50 percent recovery, ° F.	.....	.....	210.74	210.63
Temp. at 50 percent recovery, ° C.	.....	.....	99.30	99.24
Temp. increase from 20 to 80 percent recovery, ° F.	.....	.....	0.11	0.0
Temp. increaee from 20 to 80 percent recovery, ° C.	.....	.....	0.061	0.0

Isooctane is potentially usable as a special solvent and as a chemical intermediate; one of the long accepted uses of this hydrocarbon is as a primary knock testing reference fuel, used in conjunction with normal heptane.

Synthetic Fibre NP 414

An important discovery in the field of man-made fibres has been announced by Imperial Chemical Industries Ltd., and the Calico Printers' Association. This product, which has so far gone by the name of "Terylene," is a polyester derived essentially from terephthalic acid and ethylene glycol. It can be made in a wide variety of dimensions, and, by varying the conditions under which the filaments are produced, variations in properties can be achieved.

In certain forms, Terylene fibres are immensely strong. The new material also has outstanding resistance to heat and light. At the same time, its general appearance and feel are good, and it should be possible to process the material on existing textile machinery by normal processes. Because of its good heat resistance, it should be capable of being ironed, laundered and pressed without special precautions. Its moisture resistance and general chemical resistance are good, and, like other synthetic fibres, it is specially good in resistance to micro-organisms and bacteria.

So far Terylene is in a very early stage of development in the laboratory, and it is only on the laboratory scale that it has yet been examined. Even if the early promise of the material is fulfilled, years will elapse before the fibre can be available in appreciable quantities for the textile industry.

Dithiodiglycol NP 415

"Thiokol" SC-10 is the trade name of commercial dithiodiglycol ($HOCH_2CH_2SSCH_2CH_2OH$) as manufactured by the Thiokol Corporation. It has a mild odor, is miscible with water, and displays the usual physical and chemical properties of glycols. Its properties are as follows:

*Color:**	Amber
*Odor:**	Mildly sulfurous
Specific Gravity.	1.27 ± .01
Viscosity:	150 centipoise at 25°C (approximate)
Boiling Point:	Distills with considerable decomposition at 160-180°C at 2 mm
Freezing Point:	± 15°C (supercools to −40°C or below)
Refractive Index:	1.56 at 20°C

* The pure dithiodiglycol is colorless and odorless.

Esters of SC-10 can be made readily with acid anhydrides and acid chlorides. The esterifications with organic acids proceed readily but is accompanied by etherification of the dithiodiglycol. SC-10 can be made to etherify easily in an acid environment to give polymeric ethers. It reacts with formaldehyde and other aldehydes to give acetals.

Because it is somewhat similar in composition to leather, wool, hair and proteins, it should be of interest for modifying their physical properties. It wets these materials easily and should be useful as a carrying agent for dyes.

Its dual nature, being both a glycol and a compound of high sulfur content, should make it an excellent solvent for sulfur dyestuffs. The antioxidant properties imparted by the high sulfur content should prove useful in this field to impart greater stability to basic dyestuff pastes and vat dyes.

Congo Copal Resin NP 416

Congo copal resin, introduced by Gillespie-Rogers-Pyatt Co., Inc., is suggested for use wherever alcohol-soluble copals were formerly used, and is available in dry form and as a 40% solids varnish, clarified. It is used presently for coating cigar bands, ladies' shoe heels, wooden toys, railway torpedoes, priming wooden venetian blind slats, etc., etc.

It has not been found to be compatible with nitro-cellulose. It is superior to Manila copal as a floor finish, and has stood up well on interior architectural trim. It may be pigmented with many inert pigments.

Unique Sylon Water-Repellent Series NP 417

A novel series of water-repellent compounds is now being marketed under the tradename of Sylon by Minnesota Mining and Manufacturing Co., St. Paul, Minn. Chemically classified as amino silanes they possess many of the properties of the silicones, and have just graduated from pilot plant to commercial production.

Sylon is available in two forms, RD602, a clear, water-white liquid, and RD611, a semi-solid. Both are soluble in hydro-

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CHEMICAL INDUSTRIES, 522 Fifth Ave., New York 18, N. Y. (12-6)

Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

NP 413 NP 417 NP 420 NP 423
NP 414 NP 418 NP 421 NP 424
NP 415 NP 419 NP 422 NP 425
NP 416

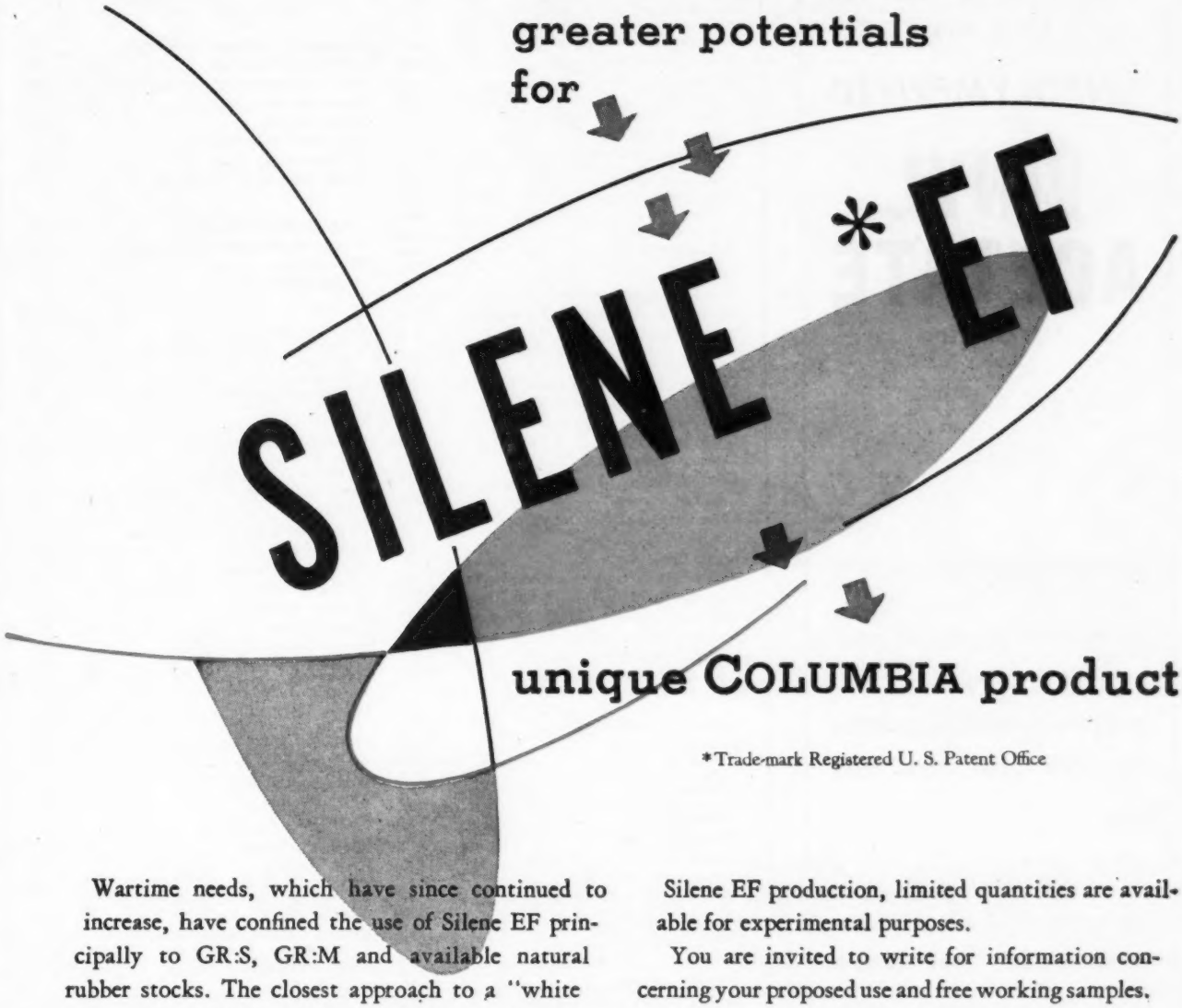
Name ..... (Position) .....

Company .....

Street .....

City ..... Zone .... State .....

a REMARKABLE performance record indicates still greater potentials for



unique COLUMBIA product

*Trade-mark Registered U. S. Patent Office

Wartime needs, which have since continued to increase, have confined the use of Silene EF principally to GR:S, GR:M and available natural rubber stocks. The closest approach to a "white carbon black," this precipitated, hydrated calcium silicate confers high modulus, hardness, tear-resistance and good tensile strength up to high loadings in both natural and synthetic rubbers.

The characteristics of this product, particularly its extremely fine particle size, indicate many other valuable uses. Among those already known is as an anti-caking agent in fine powders. Although the requirements of the rubber industry continue to utilize the majority of Columbia's expanded Silene EF production, limited quantities are available for experimental purposes.

You are invited to write for information concerning your proposed use and free working samples.

Approximate Analysis:	
CaO	19.0
SiO_2	67.0
Loss on Ignition	14.0
pH in water suspension	10.1
Specific Gravity	2.10
Bulk Density	15 to 16 lb. per cu. ft.
Refractive Index	1.475

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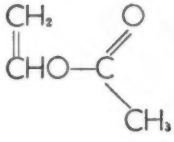
VINYL ACETATE

(STABILIZED)



Boiling Range 71.8° to 73°C

Vinyl Acetate can be polymerized to form resins with exceptional bonding qualities for wood, glass, metal and fibre.

Vinyl Acetate can be used for synthesis of a-b-di-chloroethyl acetate, b-monochlor ethyl acetate, b-chloro acetals, 2-amino thiazole, chloroacetaldehyde and many others.

Containers:—

410 lb. drums

62,500 lb. tank cars

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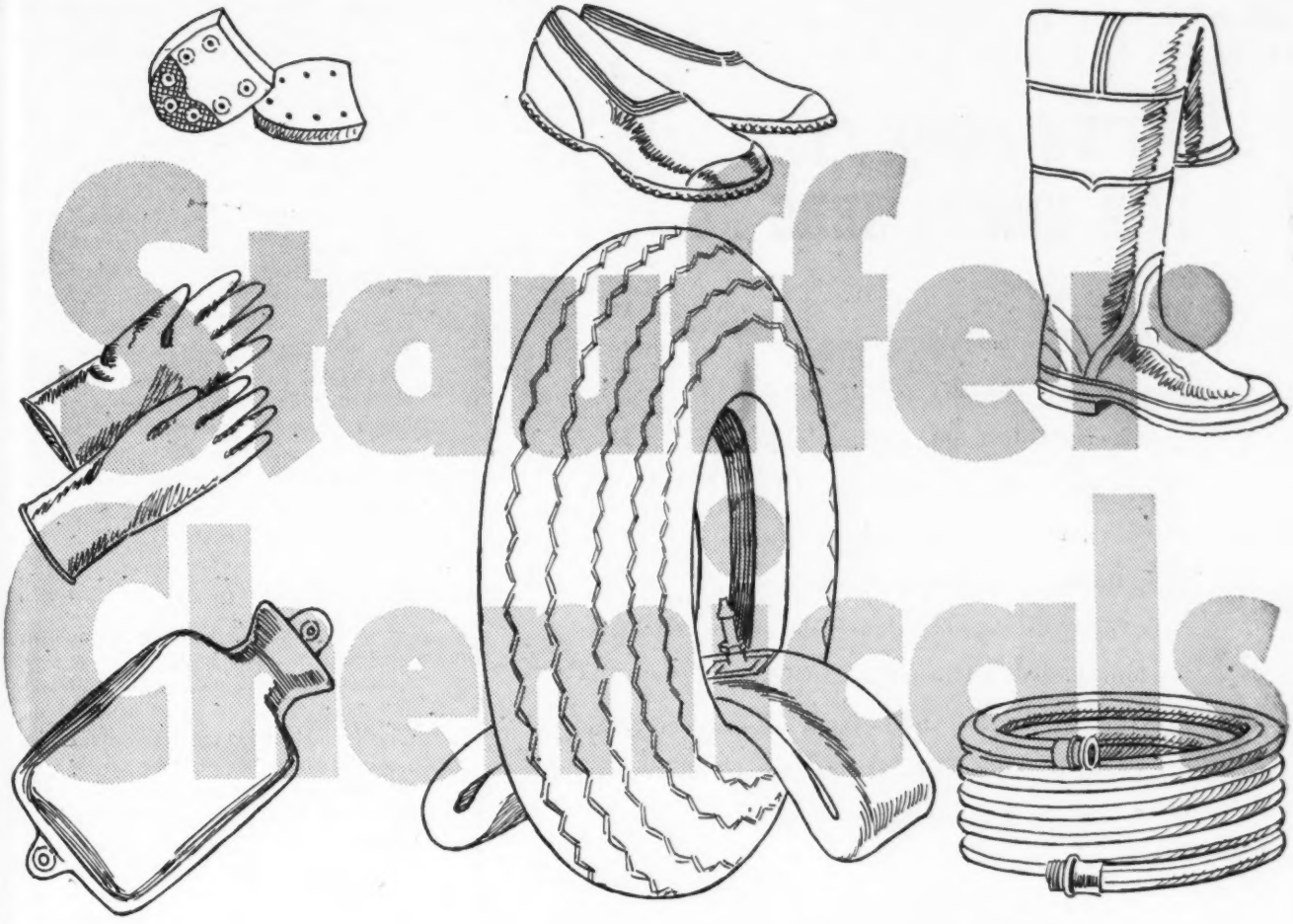

FOR THE RUBBER INDUSTRY

Since the turn of the century Stauffer has been supplying rubber-makers' sulphurs to the rubber industry. A more recent development is Crystex insoluble sulphur — an amorphous sulphur that prevents bloom in uncured rubber stocks.

If you require large quantities of quality chemicals it will pay you to investigate the products and facilities offered by Stauffer.

STAUFFER PRODUCTS

*Aluminum Sulphate	Chlorine	Rochelle Salts	Sulphur Chloride
Borax	Citric Acid	Silicon Tetrachloride	*Superphosphate
Boric Acid	*Copperas	Sodium Hydrosulphide	Tartar Emetic
Carbon Bisulphide	Cream of Tartar	Stripper, Textile	Tartaric Acid
Carbon Tetrachloride	Muriatic Acid	Sulphur	Titanium Tetrachloride
Caustic Soda	Nitric Acid	Sulphuric Acid	

(*Items marked with star are sold on West Coast only.)

STAUFFER CHEMICAL COMPANY

Stauffer CHEMICALS SINCE 1885

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221 North LaSalle Street, Chicago 1, Illinois
424 Ohio Bldg., Akron 8, Ohio—Apopka, Fla.
555 South Flower Street, Los Angeles 13, Cal.
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WE'VE DONE IT FOR EMBALMERS . . . . .

THERE are odors worse than that of formaldehyde . . . but you wouldn't care to smell them! Nor did embalmers really enjoy working with their formaldehyde solution-embalming fluids before FRITZSCHE chemists found a way to mask their harsh, acrid odors. Now, thanks to a remarkably effective group of odor neutralizers developed in our laboratories especially for formaldehyde odor-control, and known to the trade as ALDAROMES, embalmers can go about their accustomed duties without any of their former discomfort. Which suggests that—having done this for embalmers—

PERHAPS WE CAN DO IT FOR YOU!

Yours may not be as serious a problem as the embalmer's, but it may be a source of annoyance or inconvenience just the same. For that reason it might pay you to consult our Technical Perfume Division whose special function is to find an economical answer to your industrial odor problem. Chances are we can supply from stock an efficient, time-tested modifier that will quickly solve the odor problem now confronting you. Why not write us in detail and let us try?

FRITZSCHE BROTHERS, Inc.

PORT AUTHORITY COMMERCE BLDG., 76 NINTH AVENUE, NEW YORK 11, N.Y.

BRANCH STOCKS

BOSTON CHICAGO LOS ANGELES ST. LOUIS TORONTO, CANADA MEXICO, D. F.

FACTORIES AT CLIFTON, N. J. AND GRILLAMS (VAR) FRANCE

carbon solvents, and in dilute solution can be applied by immersion or spraying. The former compound is sufficiently volatile so that at 100—125° Cent. it can be applied as a vapor treatment to light fluffy fibers or powders which might be matted or agglomerated by the application of a solution.

Suggested uses include: treatment of textiles to produce water-repellency, without impairing air passage; manufacture of water-resistant papers (outdoor posters, disposable paper containers, emergency rain capes, printed forms for outdoor use, etc.); modifying the viscosity and brushing characteristics of alkyd-bearing paints, varnishes, and enamels; increasing dielectric strength of ceramics, and in treating hydrophilic granular materials which are to be bonded to organic materials—such as gravel and stone used in asphalt compositions.

Ethyl Vinyl Ether NP 418

General Aniline & Film Corporation has announced the availability of ethyl vinyl ether in limited quantities for research and development purposes. This is the fourth vinyl ether to be announced by General Aniline in the past six months, all stemming from the company's extensive research in high pressure acetylene reactions.

Ethyl vinyl ether is a versatile new chemical. It may be used as an anesthetic similar to ethyl ether or as an intermediate in chemical syntheses in the pharmaceutical and other fields. It may be converted to polymers and copolymers for use as lacquers and coatings, textile and paper finishes.

The vinyl ethers may also be used as raw materials for lubricating oil additives, rubber chemicals, adhesives, and waxes. The three vinyl ethers which have been announced previously are methyl vinyl ether, isobutyl vinyl ether and *n*-butyl vinyl ether.

Polyvinyl Butyral for Stainproof Fabrics NP 419

Monsanto Chemical Co. today announced its vinyl butyral plastic, long used as an interlayer material in safety glass, is ready for a broadscale entry into the textile coating field, where it is claimed that it will make possible such items as stainproof tablecloths, furniture slipcovers immune to ink and draperies that can be wiped clean with a damp cloth.

In sharp contrast with familiar rubberized or oilcloth type coatings, it was said, the new application affords resistance to stains and water while allowing the fabric to retain its original identity.

In the mill application process, there is bonded to the fabric a super-thin, almost-invisible coating of flexible and transparent vinyl butyral—so tightly adhering that it will not chip or peel under normal

To our friends everywhere... we, of Heyden, extend heartiest greetings and most cordial good wishes for a happy Yuletide and a prosperous New Year.

Heyden Chemical Corporation, New York, N.Y.

Is one of your present problems in this list?

The answer is there too! For the economical and efficient solution, try a PQCo. Silicate. Silicate of soda is a generic term—over 50 different brands are in the PQ Line. Be sure you get the proper ratio for your use, and be sure also that you have a fresh sample from us. The coupon below is for your convenience.

NEED	SILICATE PROPERTY USED	CHIEF ADVANTAGE	PQ BRAND
1. Hardening Concrete.	Chemical Reaction.	Dustproof, oilproof, waterproof, acidproof.	"O"
2. Preventing Corrosion in Water Lines.	Film Formation.	Efficient, with very little control required.	"N"
3. Purifying Waste Water.	Flocculation.	Clearer effluent, greater filter capacity.	"N"
4. Faster Cleaning.	Chemical Reaction, Wetting, Emulsification.	Lifted dirt does not redeposit. Rapid, but not destructive to fabric or sensitive metal.	Metso
5. Sealing Fiber Shipping Cases.	Adhesive.	Ready-to-use, strong bond.	Seal
6. Stabilizing Bleaching Baths.	Chemical.	Conserves peroxide. Produces whiter whites.	Star
7. Catalyst Support.	Chemical.	High adsorbency.	"N," "E", "S"

Philadelphia Quartz Company

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PHILADELPHIA QUARTZ COMPANY

Please send sample and directions for:

1. ☐ 2. ☐ 3. ☐ 4. ☐ We clean _____ (insert)

5. ☐ 6. ☐ 7. ☐

NAME _____

ADDRESS _____

CITY & ZONE _____

usage, and so inconspicuous that only an expert can visually distinguish a properly coated cloth from an untreated companion cloth.

Some merchandising experts have expressed the opinion the protective plastic makes the cloth more desirable and attractive from the standpoint of appearance, contending that it gives a freshly-starched look and that it accentuates the brilliance of color patterns.

Advantages of normal appearance and easy cleanability, it was stated, are accompanied by improved resistance to abrasion, longer wear, increased color fastness and a lessened tendency to stretch or shrink. It was added, the treated fabrics will stand up under repeated launderings, should this be deemed necessary, and can be pressed on the untreated side with a moderate iron.

It is a warborn development. Early in 1942, the nation was without adequate supplies of rubber for textile coating purposes, while Monsanto—due to cutbacks in auto production—had a surplus capacity for production of vinyl butyral.

Monsanto scientists collaborated with technologists of other companies (notably those of the Hodgman Rubber Co.) to perfect an application technique whereby vinyl butyral could be calendered or spread-coated onto fabrics on existing mill equipment. The result was a coating of lighter weight, greater durability, more attractive appearance and superior resistance to temperature extremes.

It is estimated that some 26,000 miles of yard-wide fabric were coated with vinyl butyral for the armed services—enough to girdle the globe, with a 1000-mile overlap.

Monsanto does not supply fabrics, coat textiles or sells the finished material. Its function is merely that of a supplier of the plastic and of the know-how required to apply it. It was also emphasized the plastic is for application in the processing, or "proffing" mill only.

Unique Process Improves Wood Stability NP 420

A novel chemical process to protect wood from swelling as a result of prolonged immersion in water or exposure to high humidity conditions is reported by Alfred J. Stamm, Forest Products Laboratory, USDA, Madison, Wisc. According to Dr. Stamm, the new method gives the highest degree of dimensional stabilization yet attained, and actually toughens the wood.

In essence, the process involves acetylation by means of acetic anhydride, and treatment with a solution of pyridine. The stabilization appears to result from a combination of a bulking effect produced in the wood and a reduction of its capacity to absorb moisture.

Dr. Stamm states that limited tests indicate that the treatment is permanent, and that strength properties are not im-

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ALL THE EXPECTED PROPERTIES . . .
***Plus* SOME YOU MIGHT NOT EXPECT**
IN *Furfuryl Alcohol*

1. Furfuryl alcohol is a primary alcohol. You can do many of the things with furfuryl alcohol that you can do with most primary alcohols. But in addition this member of the furan family has some special properties which may be of value to you.

2. Its solvent properties are responsible for its continually expanding use in the textile and textile dye fields.

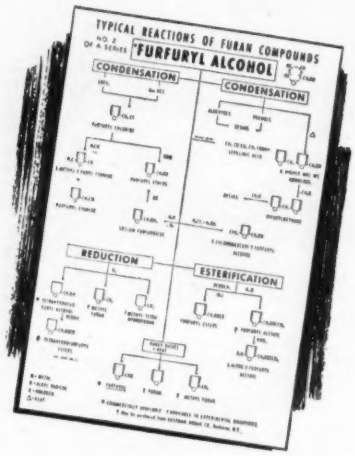
3. The wetting properties of furfuryl alcohol are being utilized in industries as diversified as textile and abrasives. These wetting properties are also carried over in furfuryl esters.

COMMERCIALLY AVAILABLE

Furfuryl alcohol has been produced commercially for several years and is now readily available in tank car quantities. You who have not yet tried furfuryl alcohol will find its ready availability and its recently reduced price other reasons for exploring its application to your particular problems. Your requests, on company letterhead, for experimental samples will be promptly filled.

REACTION CHARTS FOR THE ASKING

Graphic charts indicating typical reactions of furfuryl alcohol, in file size (8½" x 11") or for wall hanging (18" x 24"), are available for your interest in noting its versatility. Merely ask for the size you want on your company letterhead.



A technical Data Sheet No. 83 giving some of the commoner chemical and physical data and suggested uses for furfuryl alcohol is also available. The Quaker Oats Company technical staff is always ready to give help on the application of any of the furans to your specific needs.

Q. O. BRAND
Furfuryl Alcohol
(Technical)
C_4H_3O-CH_2OH

Molecular Weight	98.10
Freezing Point °C	−31
Boiling Range °C (95%)	167 to 177
Specific Gravity (25/25°C)	1.130

The Quaker Oats Company CHEMICALS DEPT.
1920 BOARD OF TRADE BLDG.,
141 W. JACKSON BLVD., CHICAGO 4, ILLINOIS
FURFURAL • FURFURYL ALCOHOL • FUROIC ACID • TETRAHYDROFURFURYL ALCOHOL

paired, and in some cases are improved. Resistance to decay and shipworms is also improved.

Emulsol Develops Four New Products NP 421

Among the detergents and emulsifying agents introduced recently by the Emulsol Corp., Chicago, are Emcol 4125, Midophate, Emcol 888, and Emcol H-47.

The first mentioned is an anion active detergent (aliphatic sulfonate of complex fatty acid derivative), recommended for use in cosmetic and industrial detergent products with profuse foaming properties. Midophate, sold as a white powder, is also an anion active material, designed for use as a dentifrice foaming detergent.

Emcol 888, as an alkyl aryl pyridinium chloride, is an odorless, amber to yellow, liquid cation active detergent, utilizable as a base for the manufacture of sanitizing products in pH range of 1.0 to 12.0, and in textile and paper processing. Emcol H-47 is an anhydrous soapless mixture of higher fatty acid complexes of polyhydric alcohols, which, as a non-ionic type emulsifier is suggested for use in DDT water-miscible sprays, solvent cleaners, and emulsion polishes.

Coating Latex NP 422

A new aqueous film-forming material by Dow Chemical Co. holds special interest for the paint, paper and textile industries. Called Dow Latex 512, it will provide an immediate source of supply to those industries who are facing current short supplies of edible vegetable oils such as linseed.

Dow Latex 512 is a combination of styrene and butadiene which when air dried forms a rubbery and tough film with excellent pigment binding properties and a high protective value, the company states. Its compatability with many aqueous emulsions or dispersions of resins, oils, varnishes, starches, waxes, casein, plasticizers and water soluble gums and pigments is another of its important characteristics.

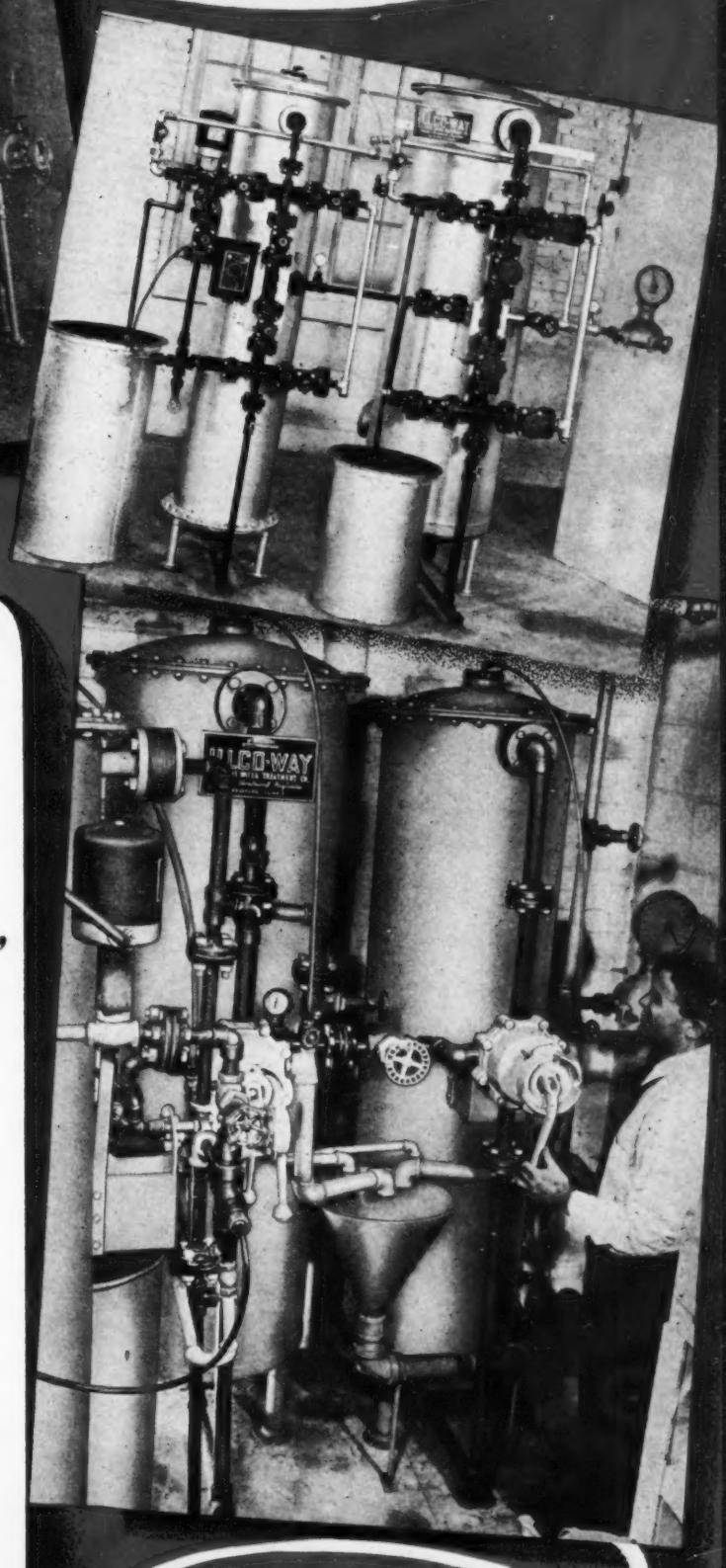
The new product is in production and immediately available in 55 gallon non-returnable steel drums and tank cars.

Anti-Foaming Agents For Marine Use NP 423

By producing more boiler makeup underway through the use of a special anti-foaming agent in salt water evaporators, ships can decrease dockside fresh water loadings and increase cargo tonnages, according to E. M. Partridge, head of the Internal Feedwater Department of The Permutit Company, developers of the anti-foaming compound.

In a trial held aboard a tanker, it was found that about one pound of anti-foamer a day, introduced into a one effect evaporator by an auxiliary pump, made it pos-

At left, an installation of Saran plastic pipe in the plant of Publicker Industries, Inc., Philadelphia, Penna. Below, Saran pipe in atomic research laboratory of University of California.



Suitability becomes a definite mission when you specify:

Saran Plastic Pipe By Commercial"

NO MATTER what the textooks and laboratory technicians may say, we always want to satisfy ourselves and you that any Saran plastic pipe system we recommend *will work out on the job.* There are many practical methods for determining this with positiveness and finality, and we insist they be used.

It is this extra care and conservative approach to the problem of using plastic pipe which is making an ever-increasing number of users write "Saran Plastic Pipe By Commercial" on their purchase orders. Consult our Engineering Department or write for Catalog C47

* *All installations pictured on this page were made by Illinois Water Treatment Co of Rockford Illinois.*

The above installation of Saran plastic pipe is in the plant of the Sylvania Electric Products Co., Flushing, Long Island.

OMMERCIAL PLASTICS COMPANY

NORTH WELLS STREET MOLDED CPC PLASTICS **CHICAGO 6, ILLINOIS**

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MAURICE A. KNIGHT: Akron, Ohio • ILLINOIS WATER TREATMENT CO.: Rockford • AMERICAN ASSOCIATED COMPANIES: Atlanta

Announcing the availability of...

20 RARE ORGANIC CHEMICALS

(Research quantities only)

Products	*Molecular Weight*	*°C*	*Unit of Sale*
n-Valeraldehyde $CH_3(CH_2)_3CHO$	86.08	B.P. 102.5-104.5	100 g.
iso-Valeraldehyde $(CH_3)_2CHCH_2CHO$	86.08	B.P. 91.5-93.5	100 g.
n-Capryl Aldehyde $CH_3(CH_2)_4CHO$	128.12	B.P. 167-172	100 g.
Propionitrile (Pract.) CH_3CH_2CN	55.08	B.P. 96-97	500 g.
n-Butyronitrile $CH_3(CH_2)_2CN$	69.10	B.P. 117-119	100 g.
n-Capronitrile $CH_3(CH_2)_4CN$	97.16	B.P. 161-164	100 g.
ortho-Tolunitrile $CH_3C_6H_4CN$	117.14	B.P. 93-94/18mm	100 g.
meta-Tolunitrile $CH_3C_6H_4CN$	117.14	B.P. 89-90/11mm	100 g.
para-Tolunitrile $CH_3C_6H_4CN$	117.14	M.P. 25-27	100 g.
Benzonitrile C_6H_5CN	103.12	B.P. 188-189	100 g.
meta-Nitrobenzonitrile $NO_2C_6H_4CN$	148.12	M.P. 115-116	10 g.
meta-Nitrophenol $NO_2C_6H_4OH$	139.11	M.P. 96-97	100 g.
meta-Nitrophenetole $NO_2C_6H_4OC_2H_5$	167.16	M.P. 31-32	10 g.
ortho-Iodotoluene $IC_6H_4CH_3$	218.05	B.P. 204-207	1 kg.
meta-Iodotoluene $IC_6H_4CH_3$	218.05	B.P. 92-94/15mm	1 kg.
para-Iodotoluene $IC_6H_4CH_3$	218.05	M.P. 34-35	1 kg.
meta-Nitroiodobenzene $NO_2C_6H_4I$	249.02	M.P. 33-35	100 g.
alpha-Iodonaphthalene $C_{10}H_7I$	254.08	B.P. 159-161/14mm	100 g.
para-Aminobenzoic Acid $NH_2C_6H_4COOH$	137.13	M.P. 187-188	500 g.
Resorcinol Monoacetate (Pract.) $HOC_6H_4OCOCH_3$	152.14	B.P. 156-159/10mm.	1 kg.

NEW ORGANIC CHEMICALS

A number of organic compounds heretofore unavailable except in the most limited quantities are about to go into research or pilot plant scale production. Inquiries are invited.

GENESEE RESEARCH CORPORATION,
572 Lyell Ave., Rochester 6, N. Y.

sible to operate the evaporator at the full rating, 28 tons, and obtain a crystal clear distillate with less than 0.2 grain mineral content.

The chief engineer reported that the anti-foamer, a stable organic compound, eliminated large amounts of foam and permitted the water level in evaporators to rise about eight inches, keeping the coils covered with solid water at all times.

The evaporation rate of 28 tons could be maintained only for a few days and then scale formation would cause capacity to drop. At the end of 12 days when capacity had fallen off to around 18 tons, the evaporator was cleaned and a new run started. Although the anti-foamer did not eliminate scale, it was found that less scale was formed when the chemical was fed into the evaporators.

By making it possible to obtain pure distillates from salt water evaporators operating at full capacity, the anti-foamer opens the door to replacing several hundred tons of fresh water with cargo.

Petrolatum Test NP 424

The development of a new test, said to afford users of petrolatum for the first time with a means of determining the ductility of petrolatum by a standardized method, is announced by L. Sonneborn Sons, Inc.

Of interest to chemical engineers, laboratory technicians and executives in countless industries where petrolatum is used, the new ductility test is said to represent a radical departure from the "hit or miss" methods commonly employed in judging ductility, giving ductility a numerical value and enabling users to select a product suitable for a particular use.

The test is based on the fact that petrolatum extruded from a vertically hanging tube will eventually break because of its own weight. Test apparatus developed by the Sonneborn research laboratories measures the stub length that remains attached to the extrusion tube after the break. Thus, the longer the stub, the greater the ductility. Reproducible results are obtained by keeping the temperature and rate of extrusion constant.

Al Wire and Brazing Flux NP 425

Elite aluminum brazing flux, a product of Air Reduction, has been developed exclusively for aluminum brazing and is now made available to meet the demand for a high grade yet economical flux with a satisfactory low melting point. Due to Airco Elite's physical properties, Airco #26 Wire, is now made available for brazing 2S, 3S, 53S and 61S aluminum. Alcoa #716 Brazing Wire, well known to fabricators of aluminum products and now being distributed to the trade by Air Reduction, is highly recommended for brazing 53S and 61S alloy analyses.

"BUT WHAT'S YOUR LAST NAME?"

Our last name is *Koppers*. Many of you know our "children" by their "first names," but do you know their last name?

That is important to us, and it's important to you, too.

Many of you vouch for the extra service you get from Fast's Self-aligning Couplings or American Hammered Piston Rings, or White Tar insecticides or D-H-S-Bronze . . . and don't know that their last name is Koppers. If you know, you are probably disposed to put more than ordinary trust in other products made by Koppers.

Did you know that you can get a Koppers product for coating metal surfaces to prevent corrosion? A Koppers material that makes roofs last longer? Lumber that defies decay and termites? And many other products made with the same skill and originality and inventiveness as those?

So . . . look for this trade-mark which will soon be found on all Koppers products. Here it is.

K
KOPPERS

It is the mark of an organization which is engaged in many phases of engineering, construction, chemistry and coal carbonization . . . is in the forefront of new synthetic developments . . . is an important supplier to the pharmaceutical industry and to many other industries. For top value, look for this mark. Koppers Company, Inc., Koppers Building, Pittsburgh 19, Pennsylvania.

THE INDUSTRY THAT SERVES ALL INDUSTRY

For example . . .
for the chemical industries

As a coal tar distiller, Koppers provides large quantities of specialties such as tar acid oils, coal tar solvents, naphthalene, tar acids and tar bases, as well as industrial pitches, roofing and waterproofing pitches, pitch coke, bituminous coatings and creosote.

As a producer of coal tar chemicals, it is the source of large quantities of benzene, toluene, xylene, phenol, the cresols, the xylenols, cresylic acids, solvent naphtha, pyridine, the picolines, the lutidines, quinoline, isoquinoline, phthalic anhydride, ammonium thiocyanate, ammonium sulfate, Flotation Sulphur*, styrene monomer, divinyl benzene, polyethyl benzene, triethyl benzene, 1-vinyl cyclohexene-3, secondary butyl benzene, as well as smaller quantities of chemicals like alpha and beta methyl naphthalenes, acenaphthene, diphenylene oxide and fluorene.

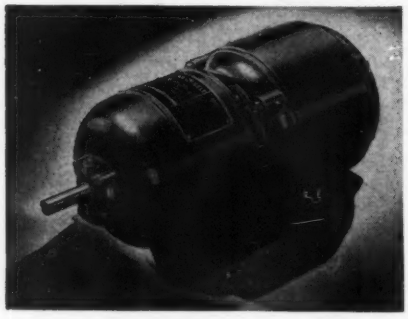
*Registered Trade-mark

NEW EQUIPMENT

Electrofluid Drive QC 999

Link-Belt announces the development of a new type of "packaged" power unit, to be known as Link-Belt Electrofluid Drive. It is presently available in horsepowers up to 20.

The Electrofluid Drive consists of a general-purpose A.C. induction motor



flange-mounted on a sturdy housing containing a hydraulic coupling, also called "fluid coupling."

Its output shaft may be direct-connected to the driven machine or to a speed reducer unit. It may also be connected to driven machine through the medium of chain, gear or belt drives.

Each fluid coupling has a primary and a secondary element. The primary element may be likened to a centrifugal-pump impeller and the secondary, or output element, to a waterwheel or runner.

The coupling is filled with a light mineral oil of a steam-turbine quality. When the motor drives the impeller it causes oil to flow through the runner buckets back to the impeller, thereby rotating the runner through the medium of the oil.

The torque of the motor is transmitted from impeller to runner by the fluid in the coupling. There is no mechanical connection between the two elements of the fluid coupling.

Regardless of the characteristics or inertia of driven machine or connected load, the motor of the Link-Belt Electrofluid Drive starts at no-load, because at zero speed the torque transmitting capacity of the fluid coupling is zero.

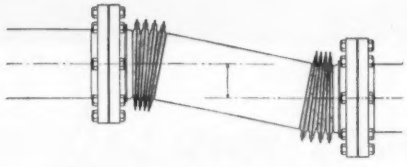
Should the driven machine become stalled, the Electrofluid Drive will pull to the maximum torque capacity of the motor, thereby drawing sufficient current to cause the thermal overload protective device to function within a few seconds.

The fluid traction coupling absorbs the energy of the motor rotor, protecting the driven machine from the shock of the rotor's inertia under sudden stoppage. Shock loads from the driven side are smoothed out and cannot reach the motor. Because the shock never strikes solid resistance, the gears, chains, belts or speed reducers in the driven mechanism are protected against severe strains and impact.

Torsional vibration is effectively cushioned by the fluid coupling, so that a smooth power flow is obtained.

Offset Joints QB 100

MagniLastic announces production of a standard line of Offset Joints. This latest addition to the MagniLastic line fills a



need for a standard flexible unit for joining pipe terminals that are out of line—or offset. This condition may be due to accumulated excess tolerances in piping sections, to settling and shifting at anchor points or hangars, thermal expansion and contraction of pipes and mountings, or to variations in operating conditions.

The MagniLastic offset joint is constructed with an equal number of expansion flanges on either end of an insert section. Length of unit and number of flanges are determined by misalignment conditions to be corrected.

Offset joints are supplied with bellows flanges from any of the MagniLastic Standard Expansion Joint series which includes pressures from vacuum to 1000 psi, pipe sizes from ½ to 24 inches, and temperatures from minus 300 to plus 1600 F. Joints of stainless steel, Monel, Inconel and copper cover all common corrosive conditions. End fittings are available in welding end or Van Stone bolted flanges.

In addition to joining offset pipe terminals, MagniLastic Offset Joints protect valves, headers and fittings from undue strain and tension.

Electronic Control for Pulverizer Feed QB 101

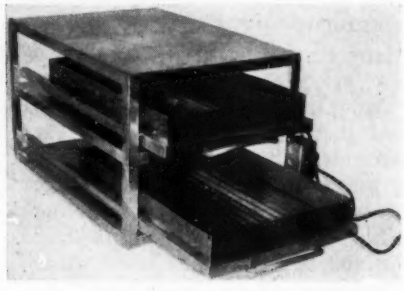
An improvement that makes electronic regulation of pulverizer feeds more dependable than ever has been announced by Mosher Electronic Controls.

Electronic regulation of pulverizer feeds has raised output of the average mill 20—35%, an increase such that electronic control has virtually replaced manual control in most sizable milling operations. Many new model grinders feature electronic controls as standard equipment.

Amplified Signal is the latest advance in coordinating feeds to maximum grinder motor load. This new principle does away with mechanical adjustment of critical relays. While sensitive to all changes in rate of feed to the grinder, the new type controls are not affected by fluctuations in power line voltage.

Infra-Red Heater QB 102

The Calesco preheater, a new development in infra-red heating, has been announced by Delt-Calesco Co. Its application is where thermoswitch-controlled low temperatures, with a minimum



plus or minus variance up to 380 degrees, are required.

The unit is open on all sides to allow released moisture to be dissipated. The drawers are separately removable from two sides. An Infra-Lectric plate consisting of aluminum-carbon alloy elements fused into tempered glass forms

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QB 100	QB 102	QB 104	QB 106	QB 108	QB 111
				QB 109	QB 112

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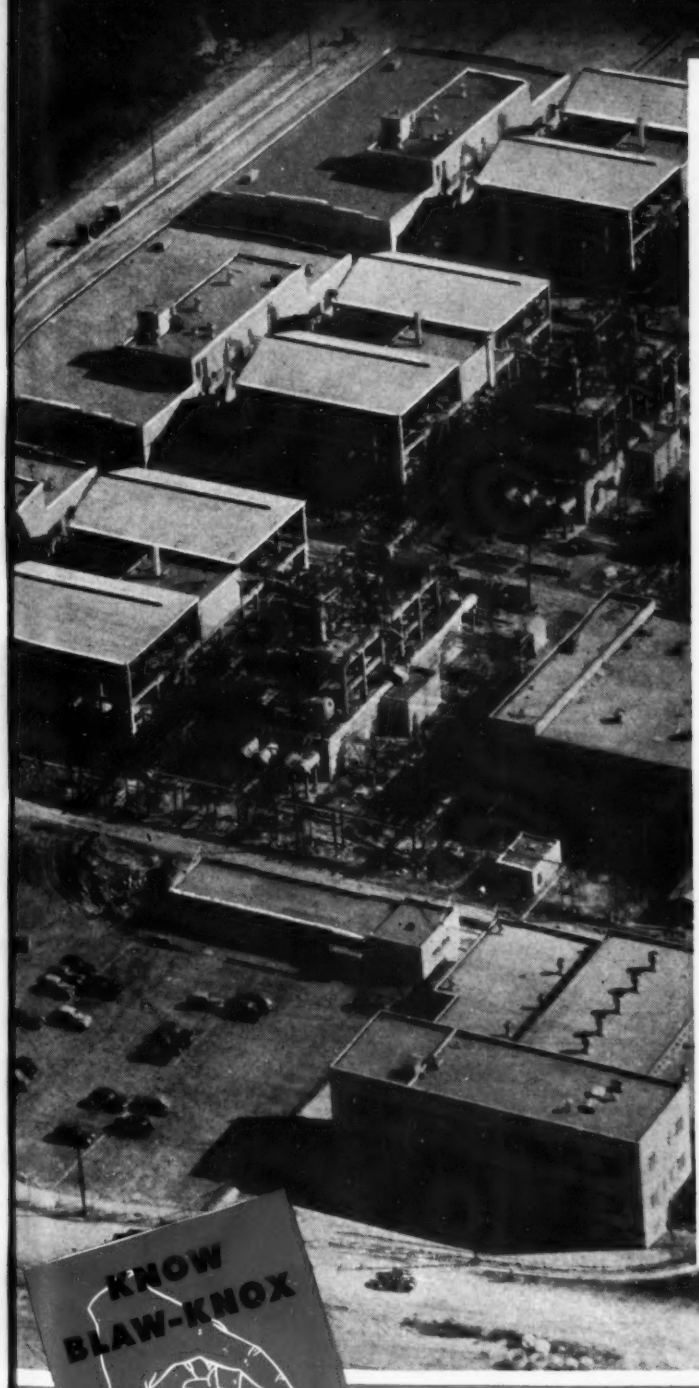
What Blaw-Knox includes in a . . .

"TURN-KEY CHEMICAL PLANT PROJECT"



Starting with the client's idea and such data as has been developed in his preliminary investigations, Blaw-Knox carries the "turn-key project" through all the steps of design, fabrication, plant construction and initial operation. These services are included.

1. Preliminary design study to establish the process requirements.
2. Selection of processing methods.
3. Fundamental engineering: flow sheets, layouts, sizing of units, and cost estimates.
4. Detail engineering: design and specification of process vessels, mechanical equipment, piping, instruments, electrification, and structures.
5. Fabrication, procurement, and inspection of equipment and materials.
6. Execution plan for the project including schedules for engineering, procurement, and construction.
7. Plant construction including preparation site, erection of structures, installation of equipment, piping.
8. Initial operation, and training of operating personnel.

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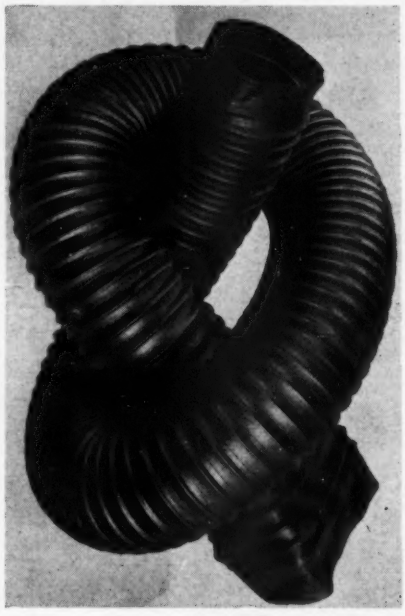
BLAW-KNOX *IMPLEMENTS* THE PROCESS INDUSTRIES

the bed of the drawer, allowing all-over even plate temperatures. Materials may be placed above or below the plate or rest directly on the surface.

Flexible Hose QB 103

A new and highly versatile process for the manufacture of light-weight spiral-wire reinforced hoses and accessories has



been developed by the American Ventilating Hose Co. It has been designated as the "Continuous Wind" process.

Using neoprene pre-coated fabrics, the new process provides for the manufacture of continuous hose lengths in any required diameter from 1" to 24". It simplifies any construction changes that may be necessary to secure various degrees of flexibility, compressibility, crushing resistance and other physical characteristics.

Cuffs, bushes, reducers or flanges can be permanently attached to any of these hose lengths if required, facilitating the connections on many types of industrial equipment.

Water Clarifier QB 104

Filtration alone is insufficient to clarify a water containing appreciable turbidity or color. In such cases, formation of jelly-like precipitates or "floc" with chemicals to entrap or absorb the finely divided impurities must precede filtration.

The apparatus in which coagulation takes place must provide for agitation of the chemicals and water followed by separation of the water from the precipitastes. But a simple mixing and settling tank is far from satisfactory for the purpose, even with provisions for varying the degree of agitation and for recirculation of sludge. To assure maximum effectiveness of clarification in the least time, with greatest economy of space and chemicals, Liquid Conditioning Corp. has developed the Liquon Sludge Contact Reactor.

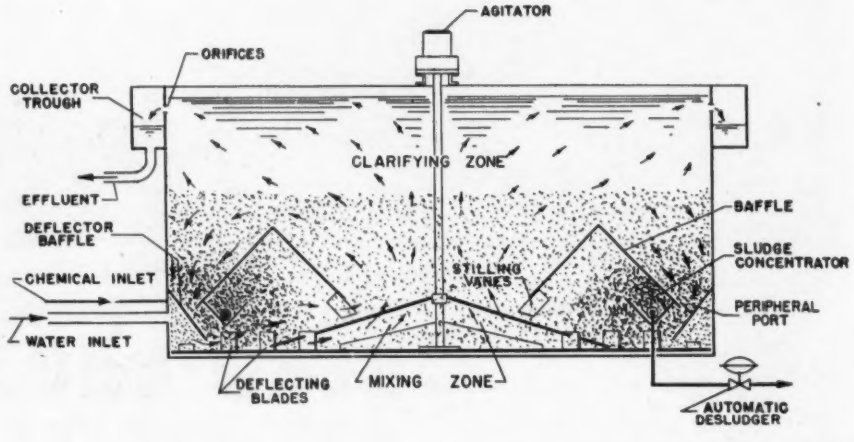
As shown in the diagrammatic cross sectional drawing, this sequence of operations is accomplished by the following features which are distinctive to the design.

1. The precipitated impurities which form a sludge with the coagulating or softening chemicals are positively recirculated as indicated by the arrows, so that the chemical is completely utilized.

2. Settling out and depositing of sludge on the floor of the tank are prevented by the large slow-moving agitator which operates over the entire bottom of the tank. This device makes it unnecessary to shut down the reactor or to use separate sludge scrapers to clean out the sludge deposits.

3. The clarified water is separated from the sludge by horizontal outward radial flow with gradually decreasing velocity. This method is superior to separation by upflow through the sludge blanket, because sludge particles separate more easily from a horizontal stream than from a vertical upflow stream. Smaller diameter tanks can be used, because danger of sludge carryover is eliminated.

4. A sludge concentrator collects and considerably thickens some of the sludge for blowoff by automatic desludging devices, keeping the top of the suspended sludge at the optimum level for best chemical results consistent with the clearest effluent.



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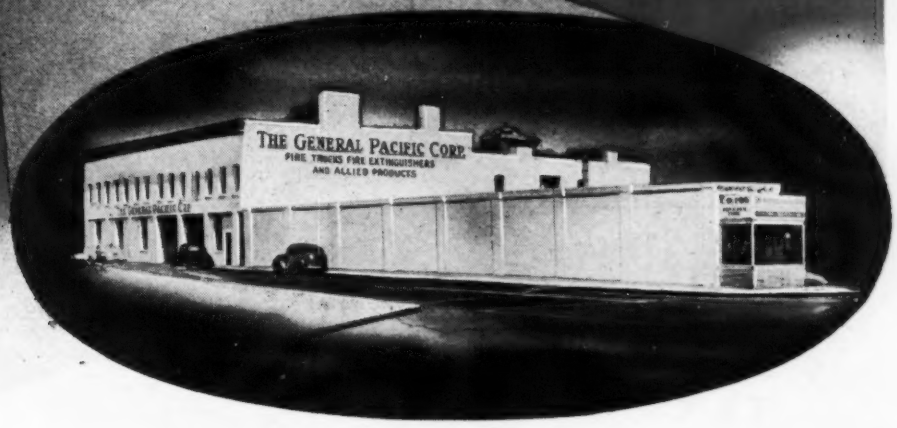
RED STAR Soda Acid Extinguisher. Releases strong stream of water under chemical pressure. Immediately effective on wood, paper, or textile fires.

Shown below is The General Pacific Corp. factory in Los Angeles, one of nine factory branches and warehouses and sixteen sales offices of The General Detroit Corp., conveniently located throughout the nation. Supplementing these is a nation-wide network of independent distributors to serve you with fire protection necessities.



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FLOAFOME Foam Type Extinguisher. Smothers fire under a blanket of foam. 2½ gallon size produces 22 gallons of foam. For use on wood, paper, textile, oil, and gasoline fires.

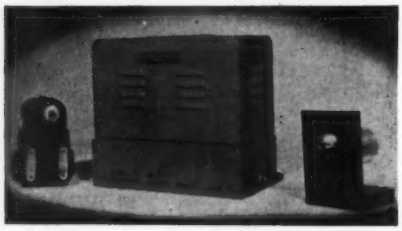
ALASKAN and PROTECTOR Pump Type Extinguishers. For wood, paper, or textile fires. Range is 45 feet. Non-freeze charge protects at 48° below zero. ALASKAN—2½ gallons; PROTECTOR—5 gallons.

PACEMAKER Knapsack Type Extinguisher. Can be strapped on back and operated from that position. Telescopic pump nozzle leaves both hands free for fighting fire. Ideal for outdoor fires.

The Liquon-Sludge Contact Reactor is equally well adapted for coagulation of turbid, colored waters, for softening of hard well waters by lime-soda, for simultaneously softening and clarifying hard river waters, and for removal of iron, manganese, silica or fluorides from water.

Servomechanism QB 105

A new remote control servomechanism has been announced by G. C. Wilson,



Co. The servo consists of three units as pictured below (Left to Right):

1. Torque Unit
2. Amplifier Unit
3. Control unit

The position of the shaft on the torque unit is controlled by the amplifier to correspond to the control unit. The system is sensitive to 1% changes in the control unit which requires approximately 1 ounce-inch of torque for operation. The torque unit develops a maximum of fifty pound feet of torque. The amplifier unit consists of three radio type vacuum tubes and associated equipment. A safety feature is provided in the signal light associated with control unit which indicates correct operation of system.

The system operates from 115 volt 60 cycle power which is supplied at the amplifier.

Rugosimeter QB 107

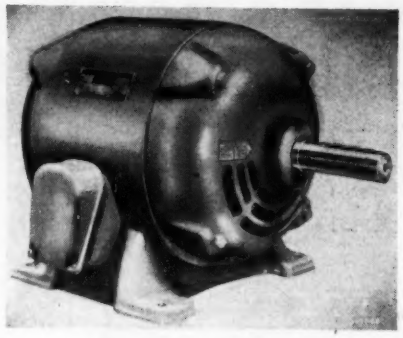
A new device that measures roughness and promises to improve quality and efficiency of rubber goods production was announced recently by United States Rubber Co.

When sheets of rubber are rolled out for production of rubber footwear and other products, their surfaces are often too rough and buckled for use. The rugosimeter, by giving a measure of this processing defect, will help determine and eliminate the causes.

It operates by measuring the resistance to passage of a stream of compressed air between the rough surface being tested and a smooth plate resting upon it, he explained. If the rubber surface is rough, the air passes easily through the "valleys." If the surface is nearly smooth, the air has difficulty in getting through. The resistance to the passage of air through these irregular channels is measured by comparison with the resistance offered by an adjustable needle valve.

Induction Motor QB 106

All steel construction—frame, feet and end brackets—makes possible a squirrel cage induction motor that is 35 per cent



smaller in size than its predecessor without sacrifice of electrical properties, according to Westinghouse Electric Corp. In addition, it is lighter, more rigid and can withstand greater impact.

Known as the "Life-Line" motor, it is available in drip-proof, splash-proof and fan cooled construction. Its special features are: a frame rolled from steel plate that is as thick as it would be if made from cast iron; feet and end brockets of heavy pressed steel; all welded construction; self-sealed, pre-lubricated ball bearings that provide effective lubrication for five years or longer without repacking; rounded corners at top and bottom of slot cells that eliminate creasing

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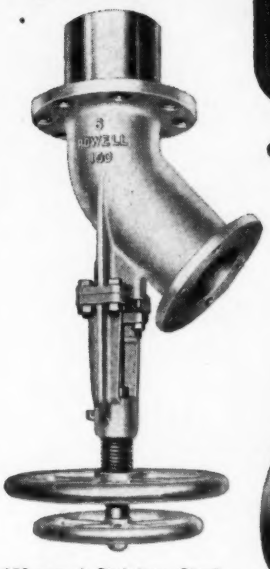
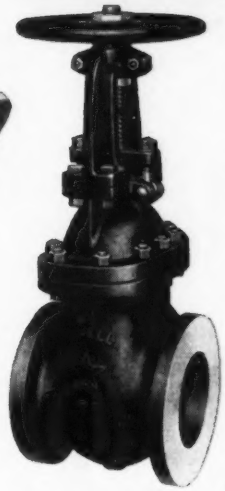


150-pound Stainless Steel Flush Bottom Tank Valve with Powell Patented Seat Wiper.



Large 125-pound Iron Body Bronze Mounted or All Iron Gate Valve.

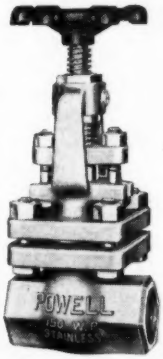
This may sound like a broad statement—but we can back it up. Because, through 100 years of making valves—and valves only—Powell has always been ready with valves that are *right*—in both design and material—to meet *all* demands imposed by the amazing growth of American Industry.

Today the Powell Line includes Bronze and Iron Valves of every necessary type, size, design and working pressure; Cast Steel Valves of every type in pressure classes from 150 to 2500 pounds; and a complete line of Corrosion-Resistant Valves, including many special designs and made in the widest range of pure metals and special alloys ever used in making valves.

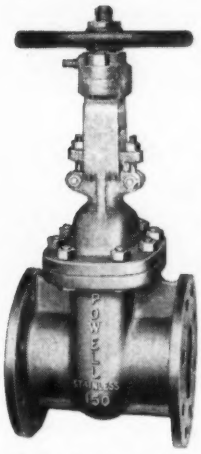
200-pound Bronze Globe Valve. Renewable, wear-resisting semi-cone plug type seat and disc.

The Wm. Powell Co., Cincinnati 22, Ohio

DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES



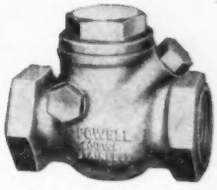
150-pound Stainless Steel O. S. & Y. Globe Valve. Gate, Angle and "Y" Valves also available in this pattern.



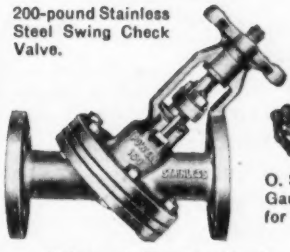
New, Standard 150-pound Stainless Steel O. S. & Y. Gate Valve.

Stainless Steel Angle Relief Valve, with enclosed spring.

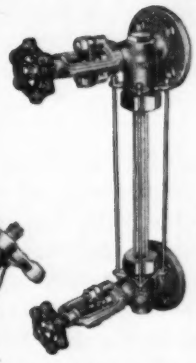
200-pound Bronze Gate Valve with renewable, wear-resisting disc.



200-pound Stainless Steel Swing Check Valve.



150-pound Stainless Steel Separable Body, Reversible Seat "Y" Valve.



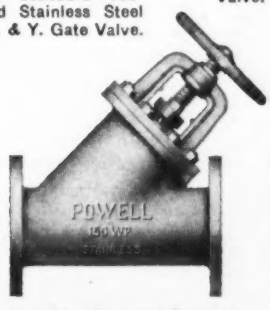
O. S. & Y. Liquid Level Gauge, offset pattern, for 150 pounds W.W.P.

Liquid Level Gauge, offset pattern, for 350 pounds W.W.P.

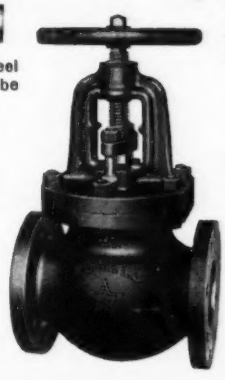
Stainless Steel Needle Globe Valve.

Stainless Steel Glass Sight Feed.

150-pound Bronze Globe Valve with renewable composition disc.



Large size 150-pound Stainless Steel O. S. & Y. "Y" Valve.



Large 125-pound Iron Body Bronze Mounted or All Iron Globe Valve.

Powell Valves for Corrosion Resistance are available in the following Pure Metals and Special Alloys. Send for booklet.

Acid Bronzes	Hard Lead	4-6% Cr. .5% Mo. Steel
All Iron	Herculoy	18-8S
Aluminum	Illium	18-8S Mo.
Ampco Alloys	Inconel**	11.5-13.5% Cr. Iron
Carbon Steel	Misco "C"	18% Cr. Iron
Durimet "20"	Monel Metal**	28% Cr. Iron
D-10	Nickel (Pure)	25% Cr. 12% Ni.
Everdur	Nickel Iron	Alloy Steel
Hastelloy* Alloys "A"	Ni-resist**	20% Cr. 15% Ni.
"B", "C" and "D"	Silver (Pure)	Alloy Steel

*A registered trade-name of the Haynes-Stellite Co.

**Registered trade-names of the International Nickel Co., Inc.

POWELL VALVES

cell insulation; special synthetic resin covered wire for coils; dynetrically balanced rotor; and interchangeability as there are only 13 parts and sub-assemblies.

It is available in sizes from ½ to 20 HP.; in voltages of 208, 220, 440, and 550; in two and three phase; in frequencies and speeds of 60 cycle—3500, 1750, 1150 and 865 rpm, of 50 cycle—2920, 1450, 965, and 720 rpm, and 25 cycle—1450 and 725 rpm; and in NEMA Standard dimension frames 203 to 326.

Counter QB 108

Potter Instrument Co. announces the availability of a new Potter instrument—the 100 K.C. Decimal Scaling Circuit.

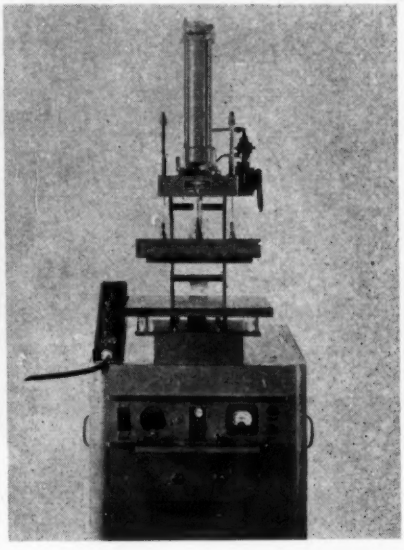
This unit, Potter Model #85, designed to respond to pulses occurring at rates as high as 100 K.C. per second, is a direct outcome of atomic energy developments and will aid precise determination of radiation intensity as a convenient and reliable decimal scaler in conjunction with Geiger-Mueller radiation detecting circuits.

By means of a simple plugging operation it is possible to obtain scaling factors of 10 to 1, 100 to 1, 1000 to 1, or 10,000 to 1. Higher scaling factors are available in other models.

Four Potter 4-tube decades are employed in the Model 85. These decades are of standard design and are being widely used in industrial and manufacturing counting applications. The four decades are included with input shaping circuits and power supply. Power consumption is 150 watts at 115 volts, 60 cycles.

Dielectric Sealer QB 109

A new 2½-in. KW Thermatron dielectric sealer, type K-3-S, especially designed for sealing, bonding, or welding



thermoplastic sheets, has been introduced by the Thermatron Division of the Radio Receptor Co., Inc.

Completely self-contained and ready to use, the new unit is designed so that the type 4 sealing press, (see cut), one of several standard types, may be mounted on the unit and operated by foot controls. Electrical operation is provided by remote control box placed at a convenient spot for ready accessibility. Straight or shaped bar electrodes make possible a wide range of seams for sheets of various lengths, and thicknesses from .002" to .040".

The new Thermatron will bond two pieces of 15 square inches in area of .004" Vinylite or a ¼" seal 60" long in approximately 10 seconds. Technical specifications for the K-3-S, better known as "Heatmaster, Jr.", are as follows:

Output: 2½ KW plus.

Line Voltage: 220 volts, 60 cycle single phase.

Frequency: 27.4 mc., or as required.

Heat Output: 8,550 B.T.U. per hour.

Tubes: New, long-life, external anode tube.

Size: 38" high, 24" wide, 28" deep.

Weight: Approximately 750 lbs.

Fitted with a standard type 4 oven, this unit may be used for heating plastic preforms, plywood, rubber, or any other use within its heat power range.

FOR QUICKER, EASIER GRINDING USE "ROLLER-TYPE" JAR MILLS

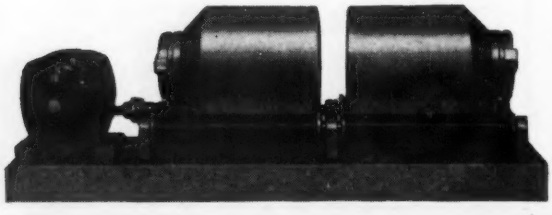
No cumbersome clamping into frames or housings—just set the jars on the rubber-covered rollers—and let them roll.

THERE just isn't anything like the ease and convenience of these "Roller-type" Jar Mills for grinding or pulverizing chemicals, pigments, minerals, etc. Savings in time and jar breakage alone quickly pay for the cost of the unit. Sturdy, rugged construction for long maintenance-free service; positive gear drive for smooth, certain grinding action. Revolving speed (with 1½ gal. jar about 50 R.P.M.).

Standard sizes accommodate one, two, three or four jars of the 1, 1½ or 2 gallon size. Larger sizes on special order.

"ROALOX" JARS

Positive locking white chemical stoneware wide-mouthed mill jar. Five standard sizes in capacities from 2¼ to 54 pints. Gasket comes out with cover. Rolls smoothly. For "Roller-type" or "standard" jar mills.



Write today for new Bulletin 210-G which describes and illustrates "Roller-type" Jar Mills, standard Jar Mills, Ball Mills, Adjustable Drum Rollers, Revolving Drum Tumblers, Chemical Stoneware, Porcelain and Steel-Jacketed Mill Jars.

U. S. STONEWARE
AKRON, OHIO

You'll find Old Friends *– and a host of new ones –* in the Texas Coast Country

Many of the industrial plants building in the Texas Coast Country are old friends of yours; some you may never have heard of. But all are important to you, because they have decided to profit from the advantages of a Texas Coast Country location. Can you afford not to follow their lead?

The Texas Coast Country offers the chemical industry everything it needs for an efficient, profitable operation; magnificent raw resources; unexcelled rail, water and air transportation facilities; native American working men and women; a mild climate; an expanding industrial market; and *natural gas — basic raw material for many chemical industries and an unsurpassed industrial fuel.*

Find out what the Texas Coast Country can offer your company. Ask for a specially prepared, confidential survey individualized to your needs. No obligation, of course. Address Research Dept., Houston Pipe Line Company, Houston, Texas.

HOUSTON PIPE LINE CO.

Subsidiary of Houston Oil Company of Texas

GEO. A. HILL, JR., President

Wholesalers of Natural GAS

Radioactivity Probe QB 110

A portable beta-gamma count rate meter, for general radioactivity surveys, has been developed by Instrument Development Laboratories.

It is an accurate and convenient device for locating radioactive products which may be health hazards or which may exist as stray materials in laboratories, lockers and work rooms, or on desks or laboratory clothing. It is also used in radioactive ore surveys, and for finding radon needles and other lost accessories.

The new Model 2610 meter has three ranges—0.2, 2, and 20 milliroentgens per hour full scale—which gives the instrument a range below the cosmic ray background and above the tolerance level.

The meter has a detachable probe with 4-foot cable for holding the Geiger-Mueller tube. Locations, not easily accessible to larger instruments, are readily explored with the Model 2610 probe. To distinguish between beta and gamma rays, the window of the probe has an adjustable shield that can be set to prevent beta particles from affecting the Geiger-Mueller tube. When not in use, the probe is clipped into a recess in the base of the instrument.

A double-receiver headset is furnished for rapid surveying operations.

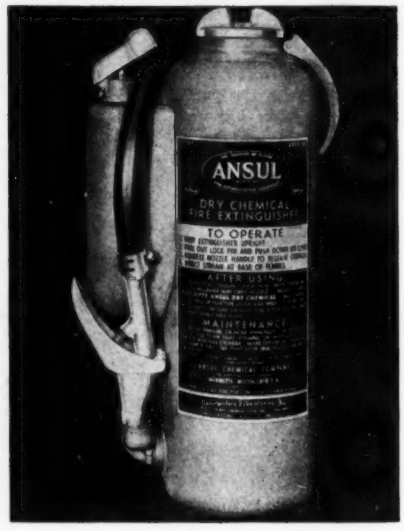
Being portable, the instrument is battery-operated. The battery life, based upon an average operating period of four hours per day, is estimated to be 500 hours. The entire unit weighs ten pounds and is housed in a metal cabinet measuring 8 by 11 by 4 inches.

Vacuum Indicator QB 111

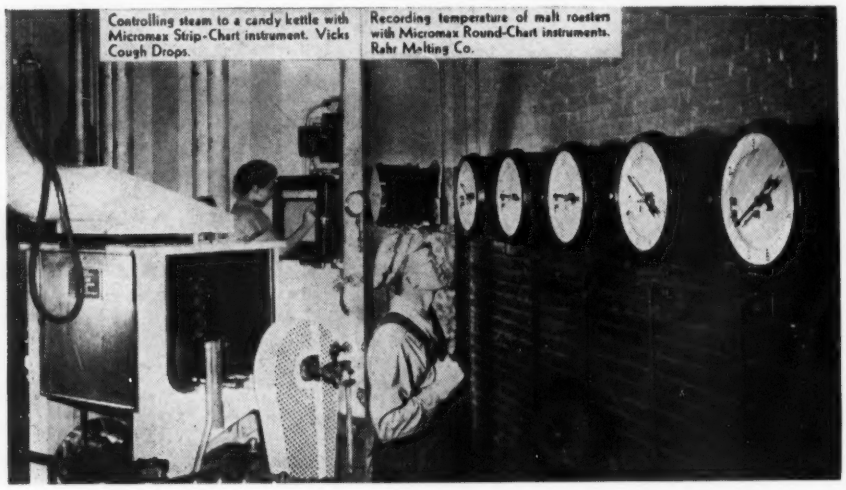
An advance has been made in the design and manufacture of vacuum indicating and recording instruments with the introduction of Televac by the George E. Fredericks Co. Televac automatically records the degree of vacuum on a continuous chart. No technical knowledge is required to operate this instrument and no adjustment or testing is necessary. Just plug it in—turn it on. The calibration of gauges is permanently stable. Electrical leakage is impossible and variations in line voltage are automatically compensated for.

Televac is made in two models; Model MR, with a range of from 0 to 500 microns, records accurately down to 1 micron and Model S which has a dual range of 0 to .4 microns and 0 to 500 microns, and records accurately down to .001 microns (10^{-6} mm Hg.).

Dry Chemical Fire Extinguisher QB 112



Increased fire-stopping power is claimed for the new Ansul-Dugas dry chemical fire extinguishers announced recently by the Fire Extinguisher Division of Ansul Chemical C. Other features claimed are: simplified and faster operation, quicker and easier on-the-spot recharge, greater heat-shielding protection for the operator, expert extinguishing by inexperienced operators and greater capacity without increased weight. They are listed and approved by the Underwriters' Laboratories and Factory Mutual Laboratories.


Controlling steam to a candy kettle with Micromax Strip-Chart instrument. Vicks Cough Drops.
Recording temperature of malt roasters with Micromax Round-Chart instruments. Rahr Malting Co.

THERE'S A "MICROMAX" ANSWER

For Most Temperature Control Problems

Here are some of the many phases of temperature regulating where it pays to use Micromax Recorders and Controllers:

Where more than one temperature is to be recorded. One Micromax instrument can record as many as 16 points.

Where accuracy is a prime factor. Micromax uses the balance principle, which is the foundation of all accurate measurements, and embodies it in powerful, fully automatic industrial instruments.

Where uninterrupted operation of a process is desired. Effects of normal use or abuse can be repaired on the job. Micromax never revisits the factory for recalibration.

There's an instrument model for any need, recording, controlling or indicating. An L&N engineer will send catalogs, or call if you prefer.

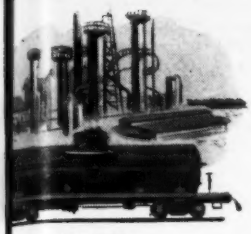
Process and building temperatures are shown by these Micromax Strip-Chart instruments. Chas. Pfizer & Co.

LEEDS & NORTHRUP COMPANY, 4982 STENTON AVE., PHILA., PA.

LEEDS & NORTHRUP

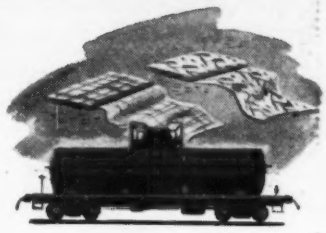
MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT TREATING FURNACES

Jrl. Ad. N-33-0880(1a)



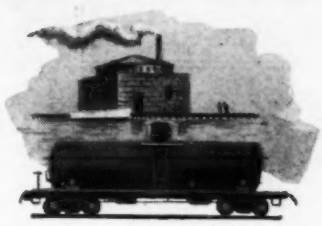
ALCOHOL

steel car, 6,000 to 10,000 gallon capacity.



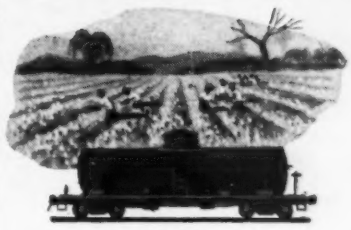
CAUSTIC SODA

Heavily insulated steel car, with or without heater coils, 8,000 or 10,000 gallon capacity. Usually specially lined.



CHLORINE

Insulated, welded car; built to withstand pressure up to 500 pounds; 15 or 30 ton capacity.

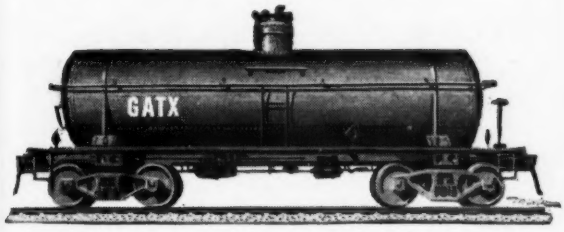


COTTONSEED OIL

Clean, steam coiled car of 8,000 gallon capacity.

FOR RENT

TANK CARS



Tank car transportation of liquids in bulk, pioneered by General American has proved its versatility, its efficiency, its economy.

The General American fleet comprises more than 37,000 specialized tank cars . . . 207 different types of tank cars . . . designed for the safe and swift hauling of an almost infinite variety of liquids.

General American's strategically located offices, plants, and repair shops keep these tank cars at your service; provide you with precisely the type of tank cars you want, *where* you want them.

If your problem is the transportation of liquids in bulk, let the nearest General American office help you.

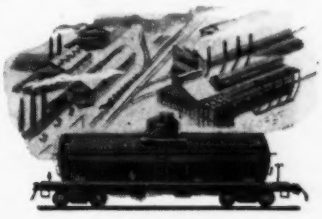
GENERAL AMERICAN TRANSPORTATION CORPORATION

GENERAL OFFICE: 135 South La Salle Street • Chicago 90, Illinois

DISTRICT OFFICES:

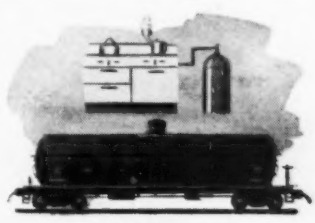
New York • St. Louis • Buffalo • Seattle • Los Angeles • Dallas • Houston
Tulsa • New Orleans • Cleveland • Pittsburgh

GENERAL AMERICAN TRANSPORTATION CORPORATION
CHICAGO



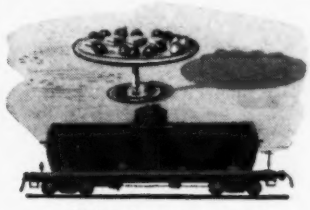
FUEL OIL

Steel car, steam coiled, 8,000 to 12,500 gallon capacity



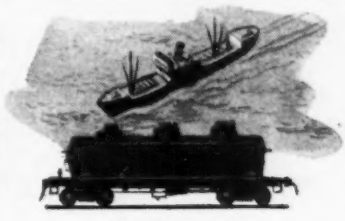
PROPANE

Heavily constructed car, welded and insulated. Built to withstand internal pressures to 300 pounds. Capacity 10,000 to 11,000 gallons.



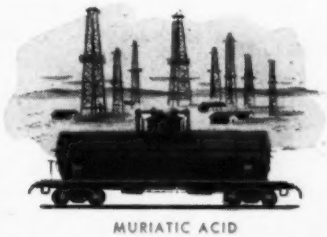
CORN SYRUP UNMIXED

Clean, steam coiled with heavy truck capacity. Usually lined with aluminum paint.



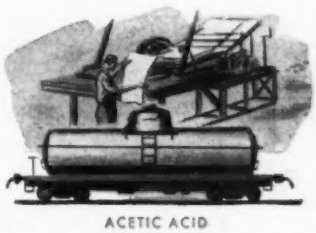
LUBRICATING OIL

Steel car, with steam coils, single or multiple compartment; usually 8,000 gallon capacity.



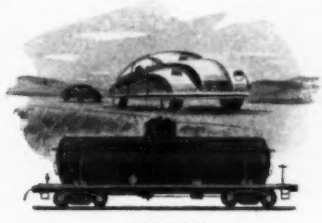
MURIATIC ACID

Car lined with pure or synthetic rubber; 8,000 to 10,000 gallon capacity.



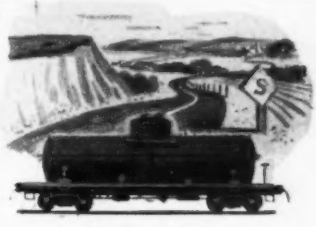
ACETIC ACID

Aluminum Car, 8,000 or 10,000 gallon capacity.



GASOLINE

Clean car, 6,000 to 12,500 gallons; single or multiple compartment.



ASPHALT OR TAR

Heavily steam coiled car; with 2 or more inches of insulation; steam jacketed outlet; 8,000 to 10,000 gallon capacity.

LARD

steam coiled car, usually of 8,000 gallon capacity.

WINE

Insulated car with one to six compartments. Interior coated to preserve quality.

MOLASSES

Steam coiled car with heavy capacity trucks; 8,000 gallon capacity.

SULPHURIC ACID

Heavily constructed steel car with heavy truck capacity. Equipped to unload through dome.

PACKAGING & SHIPPING

by T. PAT CALLAHAN

I. C. C. Regulations Amended

The Interstate Commerce Commission has amended the regulations for the transportation of explosives and other dangerous articles, effective November 4, 1946, as follows:

The commodity list, sec. 4, has been amended by the addition of the following:

Article	*Classed as—*	*Exemptions and packing (section)*	*Label required in not exempt*	*Maximum quantity in one outside container by rail express*
(Add) Acetyl benzoyl peroxide solution..	Oxy. M	153 (b), 186B	Yellow	1 quart
(Add) Acetyl benzoyl peroxide, solid....	Not accepted			Not accepted
(Add) Acetyl peroxide solution.....	Oxy. M	153 (b), 186B	Yellow	1 quart
(Add) Acetyl peroxide, solid.....	Not accepted			Not accepted
(Add) Allyl bromide.....	Inf. L	103, 110	Red	10 gallons
(Change) Benzoyl peroxide.....	Oxy. M	No exemption, 154, 157, 158	Yellow	25 pounds
(Add) Caprylyl peroxide solution.....	"	153 (b), 186A	"	1 quart
(Add) Chlorobenzoyl peroxide (para) ...	"	No exemption, 154, 157, 158	"	25 pounds
(Add) Dusts, by-product, poisonous. *See* Arsenical dust				
(Add) Lauroyl peroxide.....	"	153 (b), 157, 158	"	"
(Add) Lithium metal.....	Inf. S	No exemption, 206	"	"
(Add) Lithium peroxide.....	Oxy. M	153 (a), 173	"	100 pounds
(Add) Para chlorobenzoyl peroxide. *See* chlorobenzoyl peroxide, (para)				
(Add) Peroxides, organic, liquid, n. o. s.	Inf. L	No exemption, 110 (e)	Red	1 quart
(Add) Peroxides, organic, liquid, n. o. s.	Oxy. M	No exemption, 186A	Yellow	
(Change) Potassium peroxide.....	"	No exemption, 154, 173	"	100 pounds
(Change) Sodium peroxide.....	"	No exemption, 154, 187	"	"
(Add) Strontium peroxide.....	"	153 (a), 173	"	"
(Add) Succinic acid peroxide.....	"	153 (b), 157, 158	"	25 pounds
(Change) Urea peroxide.....	"	153 (b), 212A	"	"
(Add) Vinyl methyl ether, inhibited....	Inf. G	302, 303	Red	20 pounds

The purpose of these additions and changes is to provide for the transportation of organic peroxides which have not heretofore been specifically referred to in the Regulations, and which are now being produced.

Under "Exemptions and packing (section)" of this table, the specification paragraphs in the Regulations pertaining to the products listed give the specifications and containers which may be used. We are not quoting these amendments in full in this compilation, but any concern who is shipping any of these products should consult the sections as listed for the regulation pertaining for its movement.

There have been the following changes or amendments to sec. 110, entitled "Inflammable Liquids," and as these include permission for the use of new containers, we quote these amendments in full:

Superseding and amending sec. 110 (Inflammable liquids, order August 16, 1940, to read as follows (change):

110 Inflammable liquids, with vapor pressure (Reid test) not over 16 pounds per square inch, absolute, at 100° F., other than those for which special requirements are prescribed herein, must be prepared for shipment in specification containers as follows (see section 110 (c) for high pressure liquids and section 110 (d) for viscous liquids and section 110 (e) for inflammable liquids which are also oxidizing materials or corrosive liquids):

Superseding and amending par. (a) (2), sec. 110 (Inflammable liquids with flash point 20°F. or below), order Aug. 16, 1940, to read as follows:

(a) (2) Spec. 1A, 1C, or 1D. Carboys, glass, boxed or in barrels or kegs, capacity not over 5 gallons, except capacity not over 5 gallons, except capacity not over 6.5 gallons authorized for Spec. 1D. Must be closed, and when reused must be reconditioned and tested, as provided in the specification.

Amending sec. 110, order Aug. 16, 1940, as follows (add):

(e) (1) Inflammable liquids which are also oxidizing materials or corrosive liquids as defined in sections 151 and 240 must be packed as follows:

(e) (2) Spec. 1A or 1D. Carboys, glass, boxed, capacity not over 5 gallons for spec. 1A, and 6.5 gallons for spec. 1D.

(e) (3) Spec. 15A, 15B, 15C, 16A, or 19A. Wooden boxes with inside containers which must be: Glass or earthenware, not over 1 gallon each, cushioned with incombustible packing material in sufficient quantity to absorb the contents of the inner container.

(e) (4) Spec. 12B. Fiberboard boxes with inside containers which must be: Glass or earthenware, not over 1 quart each, cushioned with incombustible packing material in sufficient quantity to absorb the contents of the inner container.

Section 195, entitled Pyroxylin Plastic Scrap, Photographic Film Scrap, X-Ray Film Scrap, has been amended as follows:

(f) Spec. 21A. Fiber drums. Must be externally treated to provide protection against moisture.

Purpose of this amendment is to provide for an additional type of shipping container for these products.

Section 206 has been amended for the shipment of sodium, potassium and lithium metals, immersed in neutral oil.

Section 240 has been amended. This is one of the most important amendments passed on by the Commission and is a change in the definition of corrosive liquids. The new definition as prescribed by the Commission under sec. 240 for corrosive liquids reads as follows:

240. Corrosive liquids are those acids, alkaline caustic liquids and other corrosive liquids which, when in contact with living tissue, will cause severe damage of such tissue by chemical action; or in case of leakage, will materially damage or destroy other freight by chemical action; or are liable to cause fire when in contact with organic matter or with certain chemicals.

This new amendment clarifies to a great extent the definition for a corrosive liquid.

Section 246 (b) (2) has been amended by the inclusion of an additional container, I. C. C. Specification 1D boxed glass carboy, for the shipment of acids or other corrosive liquids.

Section 271 (d) has been amended by the addition of solid nickel, at least 99% pure, tank cars, Spec. 103-A or 103-AW, for the shipment of phosphorus oxychloride and phosphorus trichloride.

Section 303, par. (k), entitled "Filling limits for gases in cylinders," has been amended by adding vinyl methyl ether, inhibited. By the addition of this product, the maximum permitted filling density has been set at 68% in I. C. C.—4B300 without brazed seams; ICC-3A300; ICC-25 cylinders have been authorized.

Section 303, par. (q) (1) has also been amended as follows:

Name of Gas	*Maximum permitted filling density (see note 1)*	*Required type of tank car, note 2.*
(Add) Nonliquefied hydrocarbon gas.	Note 5	Note 7, ICC-107A

Superseding and amending par. (q) (1)

Plastic Packaging

Glass bottle, containing a pharmaceutical, was packaged originally in container held in left hand. Dipped in Seal-Peel plastic, shipping bulk was said to be reduced 75 per cent, weight reduced by one-third. Jar was dropped on concrete pavement and did not break. The plastic will withstand 600 p.s.i., a temperature range from —120° to 160° F., electrical potential up to 440 volts.

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Wilmington, Calif.

note 7, sec. 303 (Compressed gases in tank cars), order January 23, 1946, to read as follows:

Note 7: Before any ICC-107A tank car may be used for shipments of hydrogen or nonliquefied hydrocarbon gas the following requirements must be met: Each tank must be equipped with one or more safety devices of approved type and discharge area, the discharge outlet of each safety device must be connected to a manifold having an unobstructed discharge area of at least one and one-half times the total discharge area of the safety devices connected to the manifold; all manifolds must be connected to a single common header having an unobstructed discharge outlet pointing upward and extending above the top of the car; the header and the header outlet must each have an unobstructed discharge area at least equal to the total discharge area of the manifolds connected to the header; the header outlet must be equipped with an approved ignition device which will instantly ignite any hydrogen discharge through the safety devices.

Section 355 (a) has been amended as follows:

Superseding and amending par. (a), sec. 355 (Arsenical dust, arsenical flue dust, etc.), order Aug. 19, 1946, to read as follows:

(a) Arsenical dust, arsenical flue dust, and other poisonous noncombustible byproduct dusts from metal recovery operations, not subjected to dangerous spontaneous heating, and arsenic trioxide, or sodium arsenate, when delivery is made to plants with private sidings only, may, in addition to containers prescribed in section 354, be shipped in sift-proof, self-clearing, hopper or bottom outlet steel cars or in sift-proof all steel flat bottom gondola cars with fixed sides and ends equipped with water-proof and dust-proof wooden or steel covers well secured in place for all openings, or in sift-proof box cars of all steel construction only when said cars are assigned exclusively to this service. See section 567 (b) for cleaning cars. Such cars, when exclusively in this service, are not subject to the requirements of section 567 (b).

Section 401 (c), entitled Packing Dangerous Articles, has been amended by the inclusion of liquid oxidizing materials.

Section 404 (g) has been amended as follows:

For corrosive liquids other than acid and alkaline caustic liquids, the words "Corrosive liquid" may be substituted for the word "Acid" on the white "Acid" labels; for alkaline caustic liquids, the words "Alkaline caustic liquid" may be similarily substituted.

Section 404 (f) entitled "Yellow Label for Inflammable Solids and Oxidizing Materials" has been amended by slight changes in the wording of the label. However, labels complying to previous requirements which are on hand may be used until further word of the Commission.

Bag Closer

Richardson Scale Company, Clifton, New Jersey, has announced reestablishment of its Richardson Bag Closer production lines, discontinued because of material shortages during the war. Again it has appointed the Bemis Bro. Bag Co. as exclusive distributor of the machine.

No motor or electric power is necessary in operating the Richardson bag closer; it functions on a friction drive. As the closer is drawn across the bag, friction rollers rotate on double-row, felt-sealed ball bearings, which require no lubrication, and transmit power to the needle through a train of gears operating on oilless bearings. The complete machine weighs only 8 pounds and is made as an aluminum die casting.

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Buying a good steel container is not a hit-or-miss proposition. You want ruggedness...you want quality... and you want economy. That's exactly what you get in Continental's line of steel pails and drums. Whether your product is liquid, solid or semi-solid, there's a Continental container to package it.

Right now we are not able to make enough containers to go around, but when we can, it will pay you to aim for the Continental Triple-C —for the best in quality, and the best in service.

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The Triple-C means best in quality, service

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PLANT OPERATIONS NOTEBOOK

NOMOGRAPH-OF-THE-MONTH Edited by DALE S. DAVIS

CHEMICAL INDUSTRIES *will be happy to receive any charts which you may have developed so that they may be shared with your fellow engineers. The authors of each chart published will receive an honorarium of $10.*

Water Flow Nomograph

by COLEMAN J. MAJOR

Sharples Chemicals, Inc.
Wyandotte, Michigan

The chemical engineer often has occasion to calculate the frictional pressure drop in commercial iron and steel pipe lines carrying water. He generally uses the familiar Fanning equation[1] and the established friction factor data as the basis for his calculations. The actual computations, however, are quite time consuming and there is always the chance for a misplaced decimal point. A nomograph has been prepared which offers a rapid means of obtaining an approximate solution to the Fanning equation as applied to water flowing in the turbulent region through clean commercial iron and steel pipe.

The Fanning equation may be written in the form

$$F = \frac{32fLp^2}{\pi^2 g D^5}$$

where F = pressure drop due to friction, feet of fluid flowing
f = friction factor
L = length of pipe, feet
q = rate of flow, cubic feet per second
g = acceleration of gravity, feet per second, per second
D = internal pipe diameter, feet.

For turbulent flow through clean iron and steel pipe of from 1 to 12 inches in diameter, the friction factor is represented by the equation[2]

$$f = 0.0035 + 0.264 \left(\frac{\mu}{DG}\right)^{0.42} \quad (2)$$

where μ = fluid viscosity, pounds per second-foot.
G = mass velocity, pounds per second per square foot.

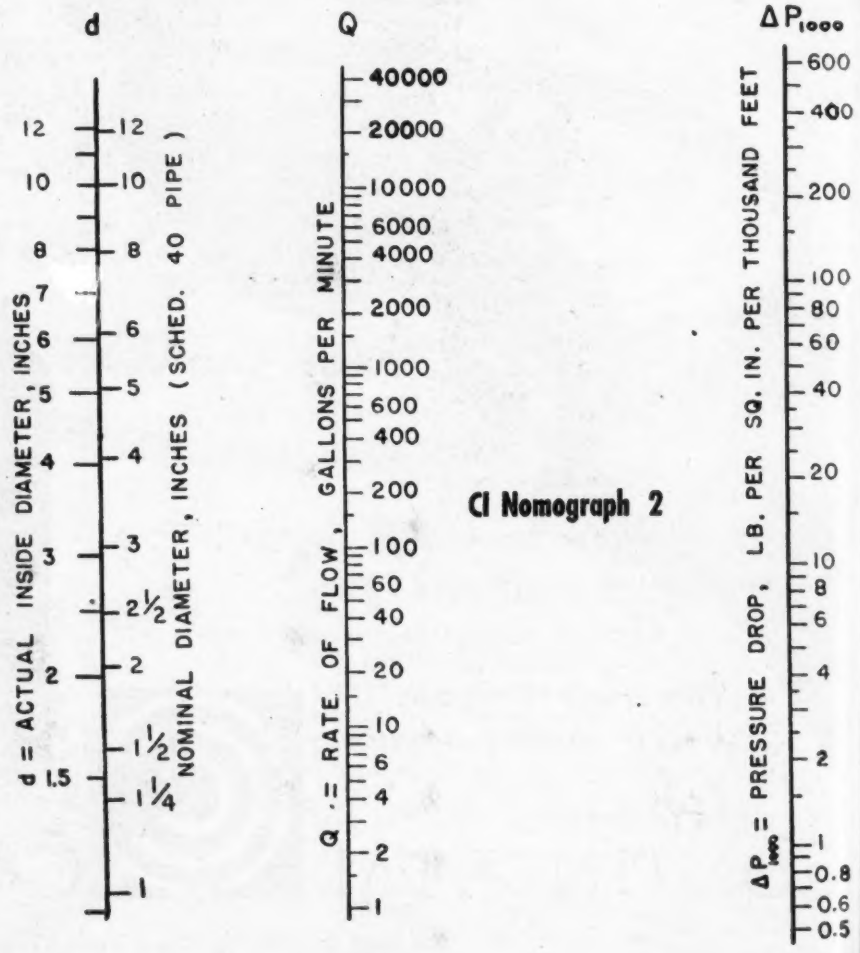
At a temperature of 68°F. the viscosity of water is equal to 1.00 centipoise and its density is equal to 62.3 pounds per cubic foot. Using these constants and combining Equations 1 and 2, one obtains the following relation between pressure drop, rate of flow, and pipe diameter:

$$\Delta P_{1000} = 53.9\left[0.0035 + 0.00895\left(\frac{d}{Q}\right)^{0.42}\frac{Q^2}{d^5}\right] \quad (3)$$

where ΔP_{1000} = pressure drop due to friction, pounds per square inch per thousand feet of pipe
d = internal pipe diameter, inches
Q = rate of flow of water, gallons per minute.

It has been found that if log ΔP_{1000} is plotted against corresponding values of log Q^2 obtained from Equation 3 for various values of pipe diameter, a family of substantially straight lines is obtained in the range of pressure drop of 0.5 to 600 pounds per square inch per thousand feet of pipe. Thus, the accompanying nomograph, which consists of two parallel logarithmic scales (Q and ΔP_{1000}) and an empirically determined diameter scale, will give an approximate solution to Equation 3. Since the log ΔP_{1000} versus log Q plot is not strictly linear, the nomograph does not solve Equation 3 exactly. The results, however, are within the accuracy of the friction factor data and are also within the accuracy required in most engineering calculations.

As an example of the use of the nomograph, let it be assumed that water is flowing through a standard 2-inch pipe at the rate of 70 gallons per minute. By drawing a line through 2 on the nominal diameter scale and 70 on the rate of flow scale, one reads the pressure drop as approximately 40 pounds per square inch per thousand feet. The calculated value from Equation 3 is found to be 38.8 pounds per square inch per thousand feet.


d
Q
ΔP1000
d = ACTUAL INSIDE DIAMETER, INCHES
NOMINAL DIAMETER, INCHES (SCHED. 40 PIPE)
Q = RATE OF FLOW, GALLONS PER MINUTE
ΔP1000 = PRESSURE DROP, LB. PER SQ. IN. PER THOUSAND FEET
CI Nomograph 2

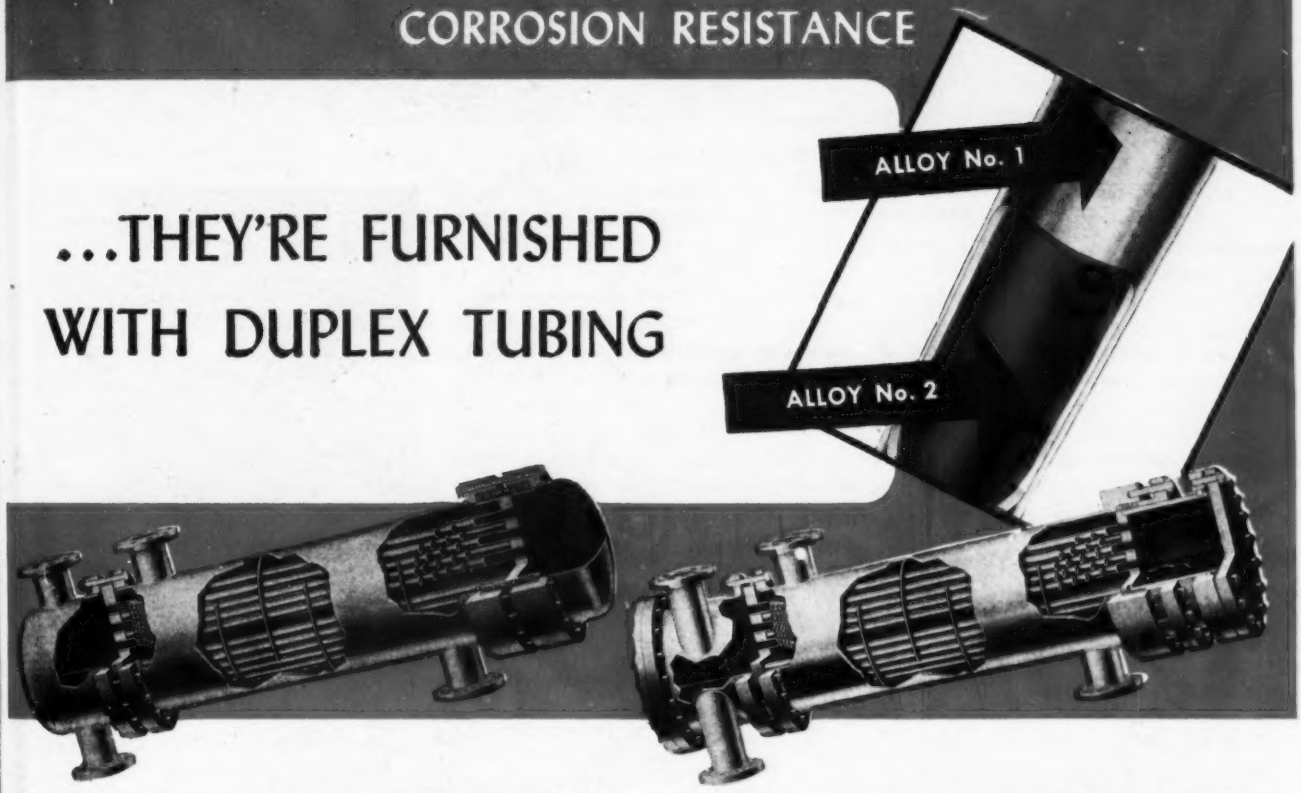
BIBLIOGRAPHY

1. *Perry, J. H., "Chemical Engineers' Handbook," 2nd ed., p. 805; New York, McGraw-Hill Book Co., Inc., 1941.*
2. *Ibid, p. 812.*

PATTERSON-KELLEY
Heat Exchangers
AND
Process Equipment

PATTERSON-KELLEY HEAT EXCHANGERS WITH DOUBLE CORROSION RESISTANCE

...THEY'RE FURNISHED WITH DUPLEX TUBING



Duplex Tubing in Patterson-Kelley Heat Exchangers provides maximum corrosion resistance for both inner and outer contacts. From a wide range of metals for inner and outer components of the tubing the best combination may be selected for resisting the two liquids or gases encountered. In contrast with monometal tubing, the corrosion resistance of neither inner nor outer surface need be sacrificed.

In Duplex Tubing there are no fixed combinations of outer and inner tube components. Practically any combination of corrosion resisting metals can be furnished. That's why these Patterson-Kelley Heat Exchangers give *maximum* resistance to corrosion for both contact surfaces.

Our engineers will be glad to discuss the application of Duplex Tubing construction for the heat exchangers you need.

Here are a few of the Patterson-Kelley Heat Exchanger applications with Duplex Tubing and the products handled:

Application	*Tube Components*	*Products in Contact*
Ammonia Liquor	outer—steel inner—copper	ammonia—liquor treated river water
Formaldehyde	outer—aluminum inner—copper	formaldehyde water
Acetic Acid	outer—aluminum inner—copper	acetic acid water
Hydrocarbon Vapor	outer—arsenical admiralty inner—steel	water hydrocarbon vapor
Plastics	outer—arsenical admiralty inner—aluminum*	water raw plastics
Amino Compound	outer—copper inner—steel	water nitrogen compounds
Soap Solution	outer—steel* inner—arsenical admiralty	soap solution water
Beer Cooler	outer—copper inner—steel	beer water
Edible Oils	outer—aluminum inner—arsenical admiralty	food products water
Carbonated Liquid	outer—aluminum inner—copper	carbonated liquid water

*to avoid color contamination

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LABORATORY NOTEBOOK

Radar Spectrum Used for Analysis

An application for radar waves in the laboratory has been developed by Dr. William E. Good, physicist at the Westinghouse Research Laboratories, Pittsburgh.

The microwaves—radio waves only a few inches in length—are generated by an electronic vacuum tube and directed through a brass tube 15 feet long and an inch in diameter. A sample of the gas under examination is placed in the barrel, and the transmitted waves are absorbed by a target at the far end of the tube and measured electronically. By varying the monochromatic frequency of the incident waves, an absorption "spectrum" can be plotted for the compound.

These spectra, like infra-red spectra, are expected to yield information on molecular structure and characteristics.

Laboratory Packing Gland

Rhodes Industrial Corporation, East Hampton, N. Y., has announced a new laboratory packing gland for use with a quarter inch shaft. The packing gland will permit flask stirring rods. The gland comes equipped with several different washers to permit its insertion in rubber stoppers to fit flasks having neck sizes from 1" up. The standard model is supplied in brass at $3.95; aluminum and stainless steel are available also at slightly higher prices. Complete information on the standard model as well as special sizes is available from Rhodes Industrial Corporation.

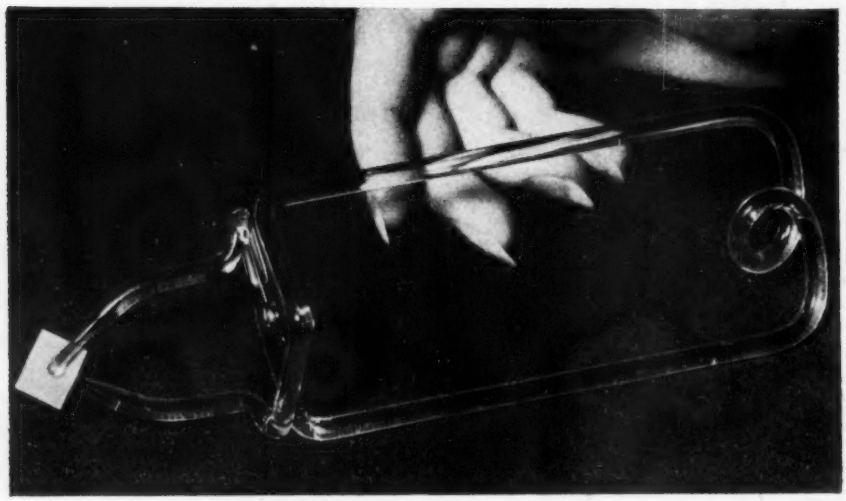
Silicone Grease Film Removal

The unique advantages gained through use of silicone stopcock and high vacuum greases have been reluctantly given up by some micro-analytical laboratories because of the difficulty encountered in removing the non-wetting film formed on laboratory equipment by these lubricants. The best cleaning methods previously developed involved use of caustic solutions which had to be carefully watched to avoid etching the glass. Recently, however, discovery was reported by G. Constabaris, of the Department of Chemistry of the University of British Columbia, that they could be easily removed from laboratory glassware by decahydronaphthalene, also known as decalin or naphthalane.

The effectiveness of this solvent has been verified in the laboratories of Dow Corning Corporation. On the basis of these tests the following procedure is recommended:

1. Fill the apparatus with warm decahydronaphthalene (decalin) and allow to stand for 2 hours or more if necessary.
2. Drain and rinse once or twice with acetone and dry with a stream of filtered air.
3. The decahydronaphthalene can be reused several times before it becomes ineffective.

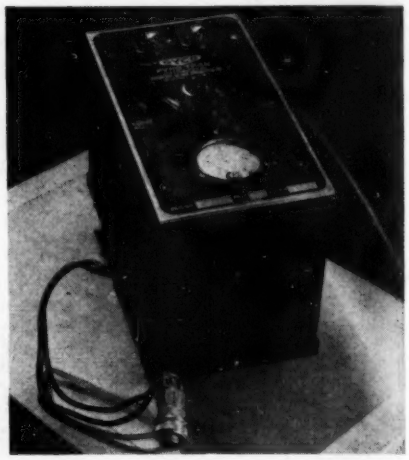
Acid-Proof Tongs



Designed by engineers of North American Philips Company, Inc., these glass tongs are used to hold quartz crystal wafers when they are dipped in the acid etching bath. Fashioned from solid glass rod by simple handling over a bunsen burner, many variations of the idea can be evolved to suit a particular purpose. These particular tongs are normally closed; pressure of the hand releases the crystal. A rod attached to one arm so as to slide into a tube attached to the second arm can easily be added to act as a "stop," thus preventing glass breakage due to an excessive "squeeze."

Heating Jacket Control

The Gyco Pyro-Tran is a new heavy-duty two-in-one transformer and pyrometer recently introduced by Scientific Glass Apparatus Co., Inc., Bloomfield, N. J. Although designed primarily to



control temperatures in heating jackets, it can be used wherever a variable transformer is required. The Pyro-Tran can operate at full power for a long period of time at high amperage load without any appreciable heat rise.

The principal feature of the Pyro-Tran is the method of controlling voltages by two snap-type switches; one for primary adjustment and the other for vernier adjustment, giving approximately three volt step-ups.

A Weston pyrometer is built into the Pyro-Tran to indicate operating temperatures up to 400° C. The dial has both C. and F. scales for convenient reading. A red line indicates the danger zone or maximum operating temperature for heating jackets under all conditions.

Fe and Zn Analysis In Phosphate Coatings

A polarographic method of determining the iron and zinc content in protective phosphate coatings has been developed by workers of the Rock Island Arsenal Laboratory, according to a report now on sale by the Office of the Publication Board, Department of Commerce.

The method may be used for determining the ratio of zinc to iron, as well as the amounts of iron and zinc phosphates per unit area, that is, the density of the coatings. It has been found to be a practical analytical method.

Orders for the report (PB-4397; photostat, $2; microfilm, 50 cents) should be addressed to the OPB, Washington, D. C.

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	Methyl hydroxyisobutyrate	$CH_3-C(OH)(CH_3)-COOCH_3$
AMINES	Stearyl dimethylamine	$C_{18}H_{37}N(CH_3)_2$
	Octylphenoxyethoxyethyl dimethylamine	p-$C_8H_{17}C_6H_4OC_2H_4OC_2H_4N(CH_3)_2$
	Also available: Mono-, di-, and trimethylamines	
CHLORIDES	Butoxyethoxyethyl chloride	$C_4H_9OC_2H_4OC_2H_4Cl$
	Chloroethyl "Coconate"	$RCOOCH_2CH_2Cl$ (R = alkyl residues of coconut oil fatty acids)
	Octylphenoxyethoxyethyl chloride	p-$C_8H_{17}C_6H_4OC_2H_4OC_2H_4Cl$
ALCOHOLS	Octylphenoxyethanol	p-$C_8H_{17}C_6H_4OC_2H_4OH$
	Octylphenoxy (ethoxy)$_2$ ethanol	p-$C_8H_{17}C_6H_4(OC_2H_4)_2OC_2H_4OH$*
	Octylphenoxy (ethoxy)$_4$ ethanol	p-$C_8H_{17}C_6H_4(OC_2H_4)_4OC_2H_4OH$*

*(*These products are mixtures of octylphenoxyethoxyethanols in which the indicated compound predominates.)*

We will welcome the opportunity to discuss the possible applications and reactions of these chemicals, and to send you literature and samples.
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INDUSTRY'S BOOKSHELF

Ferrous Metallurgy

THE METALLURGY OF QUALITY STEELS *by Charles M. Parker.* Reinhold Publishing Corp., N. Y. 248 pp.; price, $6.00. Reviewed by Dale E. Zabel, Kansas State College.

REAMS could be written about the metallurgy of quality steels. In fact, there are many such publications now in print covering the same scope of material as presented in this book. With such a vast field to cover it can be seen that it would take more than 248 pages to make an extremely comprehensive presentation.

This treatise does not deal in great length on any of the phases of the metallurgy of steel. However an ample coverage on the general nature of steel, method of manufacture, ingot and rolling practice, inspection and mechanical testing, heat treatment, effect of alloying elements and the hardenability of steel is given to stimulate an interest in the metallurgical science.

Many photographs, photomicrographs and sketches are used in depicting the subject matter of this book. In the section on "Methods of Manufacture" the author uses actual case histories and presents them in "log" form, in this way giving a very clear picture of what happens when steel is refined in the various steel making furnaces.

There are many books published with this same general but concise characteristic. However there has been a great need for an up-to-date volume of this type. It should not be concluded from the above statement that the author presents a lot of theories but rather he stays close to fundamental facts.

Organic Preparations

ORGANIC PREPARATIONS *by Conrad Weygand.* Interscience Publishers Inc., New York, 1945. xiii + 534 pages; $6.00. Reviewed by E. Augustus Swart, Squibb Institute for Medical Research.

IN THIS translation of Weygand's *"Organisch-chemische Experimentierkunst,"* the original German text has been but slightly revised, though it has been condensed. This condensation has been essentially effected by referring to "Organic Syntheses" and original literature sources for details of the preparation of various compounds instead of writing up the procedures in the text.

Weygand, in attempting to classify organic reactions, chose as a basis for classification the type of bond formed rather than the reactivity of functional groups. A comprehensive index and table of contents make it quite simple to find a particular type of reaction.

It is unfortunate that this excellent, well organized compendium of organic synthetic procedures was not brought up to date in its translation. It is still to be recommended, though, as a valuable addition to the library of anyone interested in organic synthesis who does not already possess the German edition.

Metal Finishing

FINISHING METAL PRODUCTS *by Herbert R. Symonds and Adolph Bregman.* McGraw-Hill Book Co., N. Y., 2nd ed., 352 pages; price, $4.00. Reviewed by Robert C. Stewart, Metallurgical Consultant.

SINCE the first edition appeared in 1935, and more particularly during the war years, rapid progress in plastics and synthetic resins has developed coatings with new and surprising properties.

This edition brings up to date the entire subject covered by the previous edition, and describes the many developments in the metal finishing field which took place in the intervening years.

Particularly important are the new chapters on coloring metals, on costs and estimating, and on organic coatings. Enlarged also are the chapters on polishing, and abrasive cleaning.

Probable cost of finishing operations to all industry is about 10% of the total value of the products manufactured, and probably the manufacturers know less about finishing than any other link in their production processes. The revision of this book at the present time is therefore timely.

Management Planning

TOP-MANAGEMENT PLANNING, *by Edward H. Hempel.* Harper & Brothers, New York. 414 pp., $4.50. Reviewed by R. L. Taylor.

A MANAGEMENT consultant and assistant professor of industrial engineering at Columbia University, Dr. Hempel is already known to many in the chemical field as the author of "Economics of the Chemical Industries," published in 1939. He has done a good job on his second venture into publishing. In this reviewer's opinion he is on more familiar ground in writing of management planning than of chemical economics, although his book on the latter subject was a useful contribution.

Top-management planning is defined by Dr. Hempel as "company orientation planning," or determination of such basic factors as size and scope of the enterprise, organizational framework, and overall objectives.

The actual scope of the book's sixteen chapters, however, is somewhat broader than this definition would indicate. Included, for example, are chapters on methods of product and process selection, sales forecasting, machine selection, and selection of plant locations. But where top management does or does not leave off depends largely on the size of company and type of industry, so the fact that the author has chosen to use a broad interpretation of the term probably adds to rather than detracts from the value of the book. The material is so arranged and indexed that considerable selectivity can be exercised by the reader if desired.

A good balance has been maintained between the theoretical and the practical throughout the book, and few hard and fast rules are laid down. In many cases several methods of planning are described and analyzed, so the reader can choose the one that best fits his circumstances. The volume is well worth the attention of anyone who is concerned with that ever-present problem of all industrial management: Where are we going, and how do we get there?

Other Publications

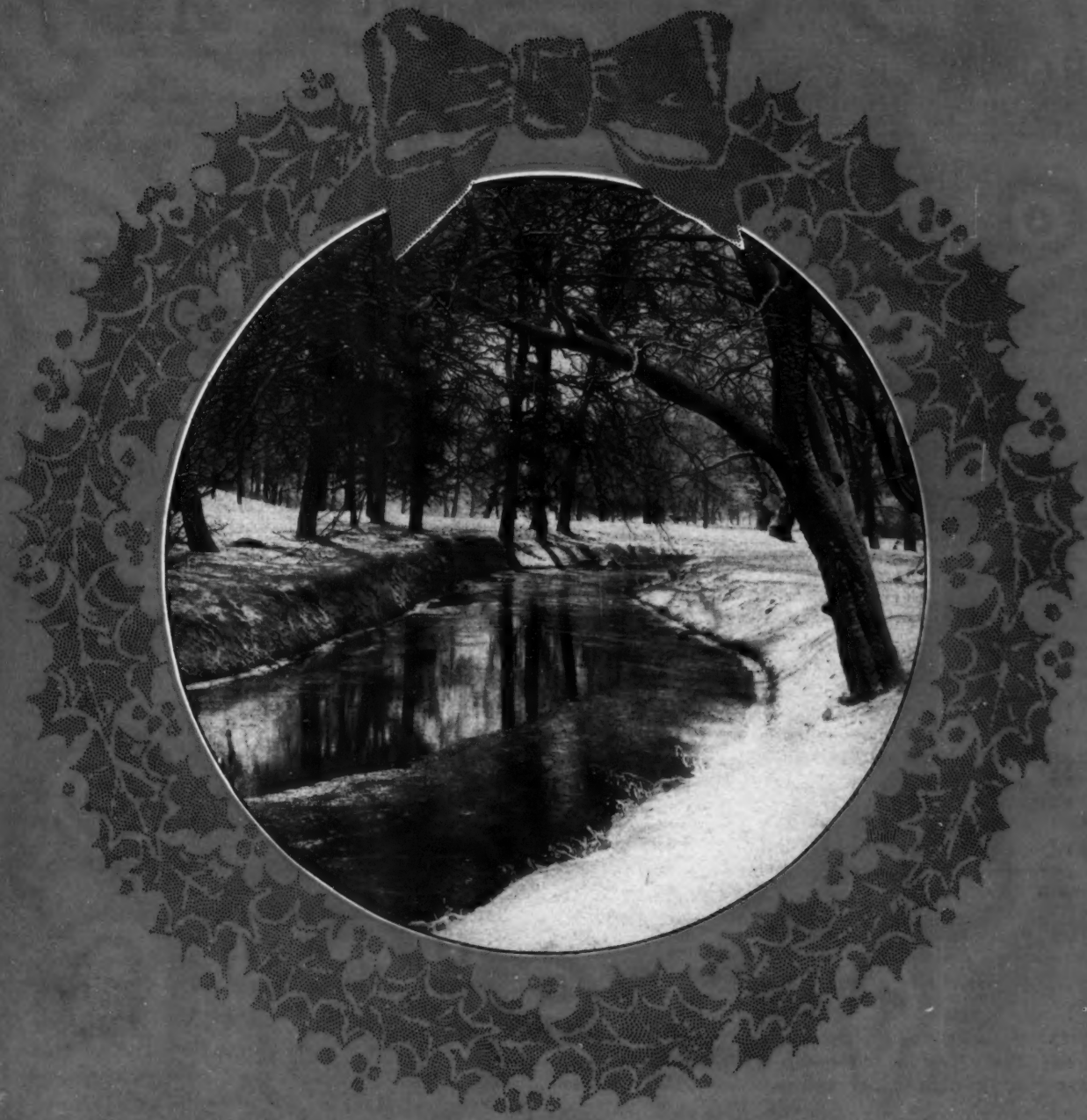
M.I.M.A. NEWS is a new four-page quarterly periodical issued by the Magnesium Insulation Manufacturers Association. Its purpose is to establish a helpful medium of contact between users of 85% Magnesium Insulations and the manufacturers and to bring information about heat insulations to industrial users. The address of the M.I.M.A. is 1317 "F" St., N.W., Washington, D. C.

ACCOUNTING MANUAL for the use of firms in the plastics industry has been published recently by The Society of the Plastics Industry, Inc. Bound in loose-leaf form to permit addition of supplementary material, the manual contains information on the installation of a sound accounting system, financial statements, classification of ledger accounts, sales analyses, accounting for manufacturing costs, and for general expenses, together with suggested forms and procedures. Copies may be obtained upon application to the Society Headquarters, 295 Madison Ave., New York 17, N. Y. The price to members of SPI is $2.50, others, $5.00.

BETZ HANDBOOK OF INDUSTRIAL WATER CONDITIONING is a 54-chapter textbook containing detailed discussions of the chemical and mechanical processes available for the treatment of water for industrial use, covering such subjects as coagulation, filtration, anion exchange, algae control and so forth. Information is presented on impurities in water, how they originate, how they can be removed and methods of analyses suitable for plant control. Copies may be obtained for $1, W. H. and L. D. Betz, Phila. 24, Pa.

MECHANICAL PACKINGS MANUAL published by the Graton and Knight Co. is a 336-page leather-bound book dealing with the selection of mechanical packings types, their application and the design of adjacent parts in hydraulic or pneumatic equipment. The primary purpose of the manual is to outline the basic principles which influence packings life and resultant machine performance. Both leather and synthetic rubber packings are discussed and operating conditions governing the selection of material are ennumerated. Copies may be obtained from Graton & Knight Co., Worcester 4, Mass. Price $4.50.

PHILIPS RESEARCH REPORTS, a recent bimonthly journal edited by the research laboratory staff of N. V. Philips Gloeilampenfabrieken of Eindhoven, Holland, affiliate of N. V. Philips, Irvington, N. Y., presents the results of research work of the entire organization. Subscription orders may be sent to Elsevier Publishing, Inc., 215 Fourth Ave., N. Y. Yearly rate $5.00.



To all - a Merry Christmas and a Happy New Year

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BOOKLETS & CATALOGS

Chemicals

B127. Acid Metal Cleaners. Nielco Laboratories has issued a 4-page technical data sheet on Ferr-O-Neil and Galv-A-Neil acid metal cleaners.

B128. Calcium Hydride. Metal Hydrides, Inc., has issued a new 28-page booklet (No. 34) concerning the present and potential uses of calcium hydride.

B129. Chemicals. Price list. Edcan Laboratories.

B130. Chemicals. Pages 34-35, 37, 41-44 are now available as replacements and additional sheets to the "perpetual" catalog of Victor Chemical Works.

B131. Chemicals. A discussion of the various chemical products manufactured by the Hercules Powder Co. is the subject of a recent 18-page booklet, "A Trip Through Hercules Land."

B132. Emulsion Cleaner. Enthone, Inc., has issued a 4-page bulletin discussing their new emulsion cleaner, EC-75.

B133. Emulsions. The seventh edition of their book, "Emulsions," has just been announced by Carbide and Carbon Chemical Corp.

B134. Fatty Acids. Section II, eight pages of Emeryfacts, describing the chemistry and uses of fatty acids has just been issued.

B135. Hydrogen Bromide. Westvaco Chlorine Products Corp. has issued a technical bulletin (No. 203) hydrogen bromide anhydrous and Hydrobromic acid 48% aqueous.

B136.* Industrial Cleaner. The American Oil & Disinfectant Corp. has issued a 6-page folder on plant maintenance with their product Whistlclean. Inquiry must be on business letter head.

B137. Insecticide. "High 3 Minute Knockdown with Low-Cost Thanite and DDT" titles a 4-page folder of the Hercules Powder Co.

B138. Nylon. "About Du Pont Nylon" titles a recent booklet issued by the Nylon Division of E. I. du Pont de Nemours & Co.

B139. Pharmaceutical and Biological Products. Price list. Sharp & Dohme, Inc.

B140. Potassium Silicates is the subject of a small 4-page folder available from Philadelphia Quartz Co.

B141. Soda Ash is the subject of a new 64-page technical and engineering service bulletin of Solvay Sales Corp.

Equipment

F927. Control System. The Allis-Chalmers Mfg. Co. has issued a 12-page bulletin (No. 14B6641) titled "Direct Current Remote Indication & Control Systems."

F928. De-Ionizer. The Chem-Pure deionizer is the subject of a 4-page bulletin of Process Equipment Corp.

F929. De-Ionizing Equipment is the subject of a recent 8-page bulletin of the Illinois Water Treatment Co.

F930. Draft Production and Dust Collection is the subject of a new 20-page catalog (No. 200) of the Prat-Daniel Corp.

F931. Evaporator. The American Locomotive Co. has issued a new booklet featuring its evaporator "flex-tube" design.

F932. Filters. The Titeflex filter, Stoneheart method is the subject of a recent 8-page bulletin of Titeflex, Inc.

F933. Flexible Tubing. The Spiratube Division of The Warner Brothers Co. has issued a new bulletin on their self-extending flexible tubing, "Spiratube."

F934. Flipswitch. The new "Y" Flipswitch is the subject of a leaflet of Speedways Conveyors, Inc.

F935. Fluid Catalyst. "Fluid Progress" titles a recent booklet issued by the M. W. Kellogg Co.

F936. Freon Water Coolers are the subjects of a recent 12-page bulletin of the Patterson-Kelley Co., Inc.

F937. Gas Appliance Regulators are the subjects of a new 12-page bulletin (No. 1136) which is available from the Pittsburgh Equitable Meter Division of Rockwell Mfg. Co.

F938. Goggles. A new catalog section (No. AWP-50) describing their line of Specti-Goggles has been issued by Eastern Equipment Co.

F939. Heaters. "Grid Unit Heaters" titles a recent booklet available from D. J. Murray Mfg. Co.

F940. Heating Jackets. The Scientific Glass Apparatus Co. has issued a new 8-page catalog describing Gyco heating jackets and their Pyro-Tran.

F941. Hoists. The Libson Hoist and Crane Co. has recently issued an 8-page booklet describing their Bob-Cat line of electric cable hoists.

F942. Inter-Com Systems. The Talk-A-Phone Co. has issued a 20-page catalog describing their line of inter-communication systems.

F943. Mechanical Foam for fire extinguishers is the subject of a 4-page booklet on Mearlfoam 5 issued by the Mearl Corp.

F944. Motor Control. "The ABC of Synchronous Motor Control" titles a recent 20-page booklet which is available from Electric Machinery Mfg. Co.

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

Chemical Industries, 522 Fifth Ave., New York 18, N. Y. (12-6)

I would like to receive the following free booklets and catalogs.

B127	B135	F928	F936	F944	F952
B128	B136*	F929	F937	F945	F953
B129	B137	F930	F938	F946	F954
B130	B138	F931	F939	F947	F955
B131	B139	F932	F940	F948	F956
B132	B140	F933	F941	F949	F957
B133	B141	F934	F942	F950	F958
B134	F927	F935	F943	F951	F959
					F960

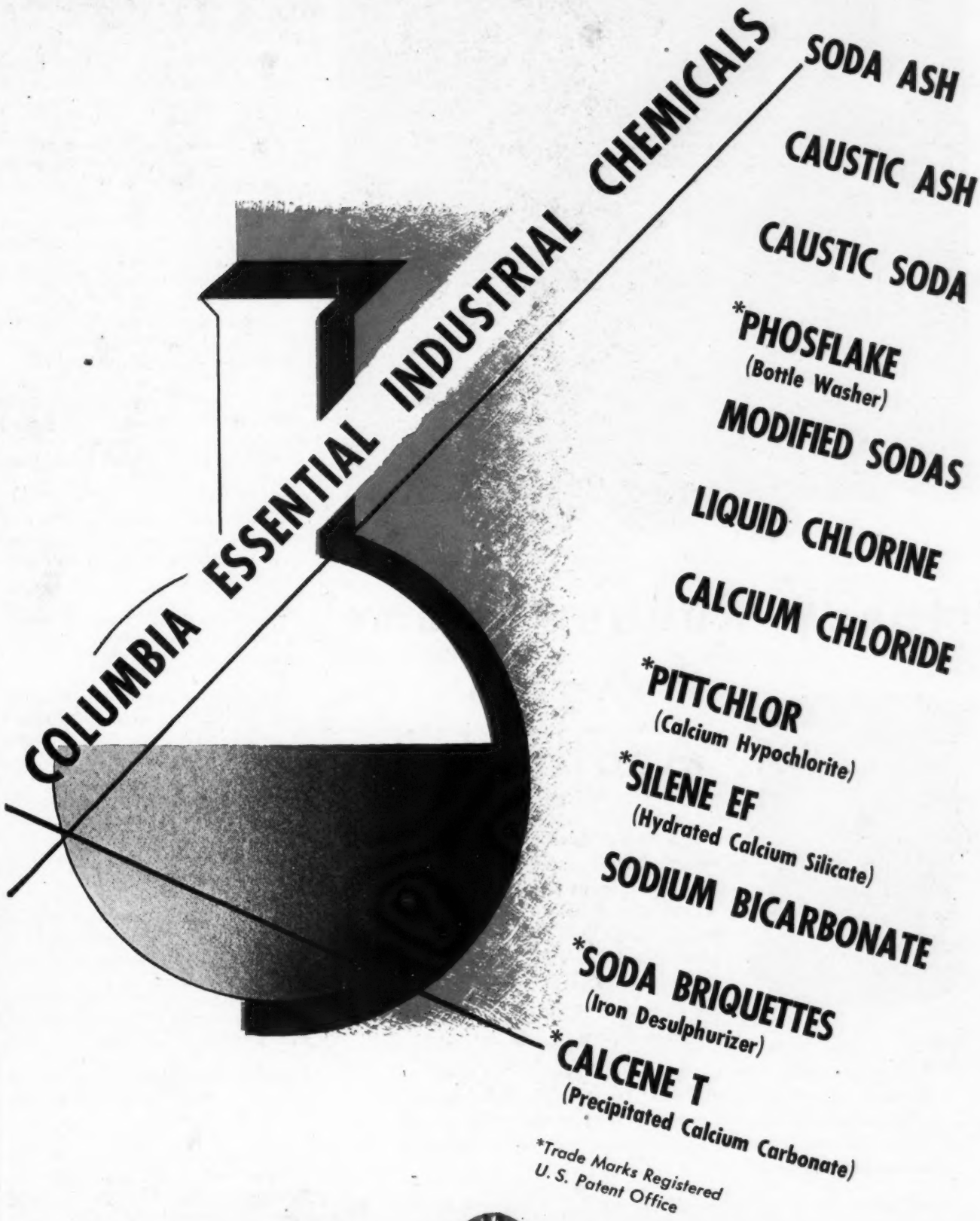
* Inquiry must be on business letterhead.

Name ..... (Position) .....

Company .....

Street .....

City ..... Zone ..... State .....



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MAURICE A. KNIGHT
212 Kelly Ave., Akron 9, Ohio

F945. MOTOR DIAPHRAGM VALVES are the subject of a new 24-page book available from Kieley & Mueller, Inc.

F946. OIL FILTERS. The Hilco Hyflow oil filter is the subject of a recent 4-page bulletin issued by The Hilliard Corp.

F947. OXYGEN INDICATOR. The MSA type "C" oxygen indicator is the subject of a 4-page bulletin issued Mine Safety Appliances Co.

F948. PATENTS. "Telling the Age of a U. S. Patent by Its Number" titles a 6-page folder issued by Invention, Inc.

F949. PUMP. The Portable Pump Co. has issued a 3-page leaflet describing their self-priming centrifugal portable pumps.

F950. PUMP. The single stage, double suction type DBL centrifugal pump is the subject of a 6-page folder (No. 240) available from the Warren Steam Pump Co., Inc.

F951. PUMPS. A gasoline powered portable pump, the Enginpump, is the subject of a 4-page bulletin of Maryland Products Co.

F952. PUMP VALVE. "Pump Valve Service" titles a recent bulletin (No. 920) issued by Durabla Mfg. Co.

F953. REFRACTORIES. The Q-Chromastic refractory surfacing motor is the subject of a 4-page bulletin (No. 315E) available from Quigley Co., Inc.

F954. ROTAMETERS. Armored rotameters for high-pressure fluid flow rate measurement and control are the subjects of a new 8-page catalog section (No. 40-A) recently issued by Fischer & Porter Co.

F955. ROTAMETER TUBE. The armored rotameter tube of Fischer & Porter Co. is the subject of catalog section 15-A.

F956. STAINLESS STEEL San-I-Tanks are the subjects of a recent 12-page bulletin of Metal-Glass Products Co.

F957. STEAM PLANT EQUIPMENT is the subject of a 12-page bulletin (No. G-1306) of Yarnall-Waring Co.

F958. TEMPERATURE CONTROLLER. The new Xactline straight line temperature controller of Claud S. Gordon Co. is the subject of a recent 4-page folder.

F959. TEMPERATURE RECORDER. The General Electric Co. has issued an 8-page bulletin (No. GEA-4572) describing their new inkless temperature recorder.

F960. UNDERGROUND PIPE LINES. The H. W. Porter & Co. has issued a 4-page bulletin (No. 461) on Therm-O-Tile underground pipe conduit.

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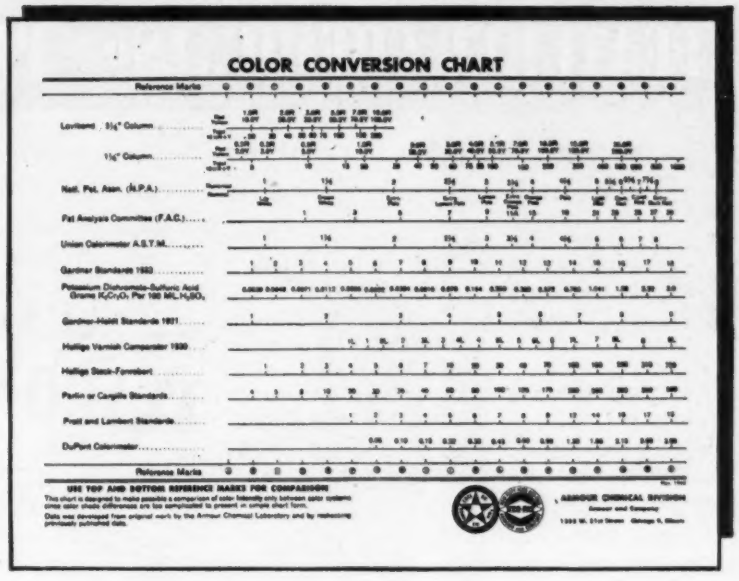

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- Iron and Ammonium Oxalate
- Iron Gluconate
- Iron Oxalate
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A white, crystalline solid, Itaconic Acid has a melting point of 167-168°C. As for solubility in water, a saturated solution at 20°C. contains 7.6 grams of Itaconic Acid per 100 grams of solution.

It can be used as a raw material in the preparation of resins of various types.

Its esters can be polymerized to yield colorless, transparent plastics of varying characteristics, depending on the alcohol with which the acid is combined. They can also be co-polymerized with other monomers, opening a wide range of possibilities.

Its structure indicates that it might prove a useful raw material for the preparation of wetting agents.

It can be converted to citraconic or mesaconic acid and forms an anhydride.

Reduction yields methyl succinic acid which, in turn, offers other possibilities as a raw material.

Itaconic Acid is not yet being prepared in commercial quantities, but limited amounts are available for laboratory research.

For samples and further information, please inquire of Chas. Pfizer & Co., Inc., 81 Maiden Lane, New York 7, N. Y.; 444 West Grand Avenue, Chicago 10, Illinois; 605 Third Street, San Francisco 7, Cal.

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NEWS OF THE MONTH

Chemical Plant Expansion Progresses Despite Shortages

As 1946, the first full post-war year, draws to a close many in the chemical industry are taking stock of the new plant construction situation. There have, of course, been many disappointments because of construction delays—but only because so many people wanted so much all at once. Yet many new plants have been started; many have been put into operation.

According to a recent Department of Commerce survey the current plans of the chemical process industries involve the investment of $800 million for new plants and equipment. Tangible evidence of these plans is found in the partial list of CPA applications and approvals of process industry firms—just those projects of over a half million total more than $300 million.

Chemical Industries has just completed a study which indicates that the back-log of replacement and expansion left over from the war may be in the neighborhood of $1.8 billion, and that the next five years may see about $5.8 billion expended on new plants and equipment. During four years of war, normal patterns of replacing equipment worn beyond reasonable repair, or obsoleted by more efficient new items, were disrupted. Depreciation reserves mounted throughout the war, and the first rush was for equipment badly needed to replace inadequate units.

New plants were next. CPA approvals to date reveal that rayon, chemicals, paper and plastics are leading in total dollars for new construction. Several trends are revealed in the locations of new process industry plants. The emergence of natural gas as a prime chemical raw material is drawing many large new plants into the Texas area. The maturing economy of the Pacific coast has brought a rush of chemical plants to the far west. Acute labor shortage in many zones is directing plants into heretofore nonindustrial districts, particularly in the South. The growth of new markets such as agriculture brings plants closer to the farming country. The lure of plentiful power at the right price is drawing new producers to the Northwest.

The chemical process industries are thus far leading all others in actively planning for future production. No other group of industries has committed so much capital for post-war expansion. While most of the investments made have come out of earned surplus, chemical firms have also undertaken vigorous new financing programs. The stocks classed as "chemicals" on the New York Stock Exchange now total larger than any other group.

Calco Appoints Randolph To Plant Post

Charles C. Randolph, Jr., has been appointed administrative assistant to D. W. H. Felch, manager of Calco's Willow Island Works. Mr. Randolph was formerly with the Barrett Company, the U. S. Tar Products Co., and the Pittsburgh Coke and Chemical Co.

WAA Sets Up Agency To Sell Rubber Plants

A Rubber Plants and Facilities Branch has been formed to dispose of 60 surplus plants producing raw materials, synthetic rubber and end-products, according to John J. O'Brien, Deputy Administrator for Real Property Disposal, War Assets Administration.

The new branch will be headed by R. F. Dimmitt and will dispose of more than $600,000,000 worth of rubber plants, most of which are still in operation under supervision of the Office of Rubber Reserve and have not yet been declared surplus.

The Interagency Policy Committee on Rubber, composed of representatives of all interested government agencies, recommended to Congress and the President that rubber facilities be disposed of to private industry, but with safeguards to assure continued manufacture and use of synthetic rubber.

WAA said that all dispositions will be in accordance with the objectives of the Surplus Property Act which provides for wide distribution, encouragement of small business, and prevention of monopolistic activities. Another basic objective will be to transfer the plants from government to private ownership with little or no disruption of production and in a manner to serve the best interests of national economy.

The Rubber Plants and Facilities Branch will confer with and assist private industry in preliminary negotiations for plants and in determining degree of participation in the syntheic rubber program.

Plants to be made available include those designed to manufacture butadiene, styrene, neoprene, butyl, guayule, GR-S, tires, tubes, soles and heels, and other products.

Limited Commercial Output Of Nylon Staple Due

Now in the experimental stages, nylon staple fiber is expected to be in limited commercial production early in 1947. Du Pont, the sole producer of nylon, anticipates that its unique properties will exert a considerable influence on the future of the textile industry. Properties of particular interest are strength, durability, lightness, and resistance to moths, fungus, and alkalies.

Tests have been made on fabrics made entirely of nylon staple and on blends with other fibers. Rug and worsted yarns have been made experimentally, and knit goods have been fabricated with the new fiber.

The use of nylon staple is expected to require new procedures in fabric finishing. It is understood that certain problems have been encountered experimentally in carding and spinning, and in dyeing of the fabrics. The solution of these problems may involve modifications in textile machinery, the use of materials for dissipating static electricity, and the development of dyestuffs and dyeing techniques.

Oil Companies Grant Cost of Living Bonus

Both Standard Oil of Indiana and Standard of California are granting a bonus of a week's pay to substantially all employees as a means of alleviating recent price increases. Currently the jump in living costs is viewed as a temporary condition. Explaining the Indiana company's action, Robert E. Wilson, chair-

man, and A. W. Peake, president, said:

"The Standard Oil Company recognizes that in recent weeks there has been an increase in the cost of living for all employees and that some consideration should be given to increasing wage and salary rates if it should turn out the the increase in cost of living continues. It should be pointed out, however, that the recent weakening in many wholesale commodity prices indcates the possibility that the country may be passing through a peak in the cost of living curve. Viewing both of these trends, the company feels that it cannot intelligently determine the necessity for general wage and salary increases until it can be more definitely established what the level of the cost of living index will be and what the general wage pattern in industry is to be.

"The company recognizes the importance of the objective of all industry to attempt to curb further inflationary tendencies."

With both these companies certain groups were excepted in granting the bonus—particularly those which have recently received wage increases.

Supreme Court Rules Pipe Lines Are Common Carriers

In a recent case where the Champlin Refining Co. protested the ICC's claim of jurisdiction over its pipeline operations, the U. S. Supreme Court has ruled in favor of the ICC. In a five to four decision the court judged that, while pipelines are not common carriers in the ordinary sense that they are "for hire," the term common carrier still applies to "all pipeline companies." The ICC powers in this Champlin case had been invoked only to require the disclosure of certain data on the company's facilities.

Chemical Corps Journal—New Publication of CWA

The recently formed Chemical Warfare Association is publishing a new magazine: its first issue, October 1946. The editors and association officers point out that there is no connection between the Journal and the War Department or the Chemical Warfare Service. Though many of the members of the organization and the magazine staff are army officers, active or retired, membership is open to any person interested in the promotion of chemical warfare preparedness for national defense providing that person is approved by the executive committee of the association. Opinions of the editors and authors of the Journal will be their own and not those of the War Department, it is stated.

McKenzie Calls for Better Retailing of Plastics

Correction of current abuses of inadequate and misleading labeling of consumer plastics goods was called for recently by Donald S. McKenzie, sales manager of the General Electric Chemical Department, before a group of retailing officials at New York University.

"My observation is that the labeling of plastics in consumer goods stores is completely inadequate in that the data provided include only the desirable features of the items offered for sale," said McKenzie. "Some of it is not only inadequate but completely misleading and makes claims which plastics cannot possibly live up to.

"Plastics are being condemned," he added, "because the consuming public buys some plastic goods without adequate knowledge of what to expect from them. Buyers and merchandisers must insist on advising the public of the foibles of the materials as well as the advantages for each specific application if the synthetics are ever going to attain the prominence they merit."

Surplus Chemicals Offered by WAA

Surplus industrial chemicals ranging from acetone to xylol, which the government bought for war purposes at a cost of $35,000,000, are being offered in a national sales campaign by War Assets Administration.

For immediate sale at fixed prices are large quantities of acids, including hydrochloric, sulphuric, hydrofloric, nitric, and tataric; all types of gas cylinders, representing low pressure, high pressure, carbon dioxide, oxygen, acetylene, propane and nitrogen; fabricating dyes in all colors and mixtures; plastic materials in all grades, sizes, shapes and colors and including powders, sheets and rods; solvents, sealing compounds, calcium chloride, dimethylaniline, copper naphthenate, synthetic and natural glues, printing inks (black and colors), zinc carbonate, picric acid, welding fluxes, detergents and cleaners, water treating compounds, coal tar, borax and boric acid, metal salts, oxide and hydroxides, pitches, rubber processing chemicals, gases, explosives and blasting supplies.

Quantities of some or all of these chemicals are located in practically all of WAA's 33 regions.

Electrolytic Manganese Produced From Stock Piles

Stock piles of manganese ores acquired by the Metals Reserve Company at three western localities are suitable for the production of electrolytic manganese according to Dr. R. R. Sayers, Director of the Bureau of Mines.

In tests at the Bureau's pilot plant at Boulder City, Nev., electrolytic manganese was produced from representative samples of Government-owned manganese ores stock-piled at Deming, N. Mex., and Cushman, Ark., and at Philipsburg, Mont.

Although some differences were reported in the results from the three ores, electrolytic manganese was made successfully from each by the standard methods

Sterling-Winthrop Research Institute Adds to Staff

Three scientists added to staff of Sterling-Winthrop Research Institute (pictured above, l to r) are: Kenneth D. Fleischer, senior chemist in the microanalytical laboratory; (M. L. Tainter, director and vice president;) Frederick C. Nachod, senior research chemist in the department of physical chemistry; and Froilan P. Luduena, senior pharmacologist.

of roasting, leaching, purification, and electrolysis, according to a Bureau publication describing the Boulder City experiments.

CALENDAR *of* EVENTS

AMERICAN CHEMICAL SOCIETY and *SOCIETY OF CHEMICAL INDUSTRY*, joint meeting and Perkin Medal Dinner, New York City, January 10, 1947.
AMERICAN CHEMICAL SOCIETY, joint meeting, Presentation of Nichols Medal, New York City, March 7, 1947.
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, Winter Convention, New York City, January 27-31, 1947.
AMERICAN SOCIETY FOR TESTING MATERIALS, Spring Meeting and Committee Week, Benjamin Franklin Hotel, Philadelphia, Pa., February 24-28, 1947.
ASSOCIATION OF CONSULTING CHEMISTS and *CHEMICAL ENGINEERS*, general meeting, Sheraton Hotel, New York City, January 29, 1947.
DRUG, CHEMICAL and *ALLIED TRADES SECTION, NEW YORK BOARD OF TRADE*, 21st annual dinner meeting, Waldorf-Astoria, New York City, March 13, 1947.
INTERNATIONAL HEATING and *VENTILATING EXPOSITION* will be held at Lakeside Hall, Cleveland, Ohio, January 27-31, 1947.
MATERIALS HANDLING EXPOSITION, Public Auditorium, Cleveland, Ohio, January 14-17, 1947.
NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION, Edgewater Beach Hotel, Chicago, week of March 2, 1947.
PACIFIC CHEMICAL EXPOSITION, San Francisco Civic Auditorium, San Francisco, Calif., October 21-25, 1947.
SOCIETY of the *PLASTICS INDUSTRY*, Industrialists of the Low-Pressure Division will hold their second conference and exhibit at the Edgewater Beach Hotel, Chicago, January 23-26, 1947.

WAA Opens DNT For Sealed Bids

War Assets Administration offers on a sealed bid basis approximately 6 million pounds of dinitrotoluene, packed in barrels and fibre drums. It cost the government $473,000.

The DNT, a component in many explosives, is the so-called oily DNT and passes ordnance specifications for a minimum melting point of 65.5 degrees Centigrade. It is an intermediate product in the three-stage nitration of toluene used in the production of the explosive TNT. DNT may be converted to nitroluidine, an intermediate in the production of certain dyes.

Bids will be received by WAA Regional Offices having inventories as follows: Chicago, 4,874,000 lbs.; Louisville, 101,825 lbs.; Kansas City, 721,875 lbs.; Richmond, 530,000 lbs.

U. S. Public Health Service Enters Nuclear Research

The U. S. Public Health Service is entering nuclear research at the Clinton Laboratories, operated for the government by the Monsanto Chemical Company, in the organization of a new biological research division as a cooperative undertaking with the National Institute of Health.

The program will include extensive research into the effect of nuclear radiation upon living cells. Considerable study must be done to determine the maximum safe exposure to nuclear radiation for workers in this field before atomic energy can have a practical use in industry.

Dr. Alexander Hollaender, principal biophysicist of the National Institute of Health, will direct the program as head biophysicist assigned to the Clinton Laboratories. He will be associated with Dr. Eugene P. Wigner, research director of the Laboratories.

Most of the biological work done in connection with the Manhattan Project during the war of necessity concerned itself with practical problems of a biological nature. Animals were used to determine the limits of tolerance for men working with nuclear energy. This practical approach to tolerance was necessary during the time of emergency because of the limited time available for preparing the raw materials for the atomic bomb. While the work on tolerance will be continued in a limited way in the new biological division, the main effort will be shifted to the more basic aspects of radiation work, such as:

1. What is the lowest dosage of radiation which will interfere with the normal function of a cell?
2. Will this effect be the same if the minimum energy is given in a fraction of a second or spread over many hours?
3. Will this effect be the same if radiation originates outside the cell or if the radiation is emitted within the cell?

The need for answers to these questions is urgent. Before there is a rapid development of nuclear energy by industry, it will be necessary to solve problems of maximum safe exposure. At present this is the major public health problem in connection with the practical use of atomic energy.

This cooperative undertaking will permit the National Institute of Health to take advantage of the new tools now becoming available at the Clinton Laboratories in its present research program on such subjects as infectious diseases, nutrition, tropical diseases, malignancy and fundamental studies in biochemistry and physiology.

French Paint Makers Visit Hilo Plant

John H. Schumann, president of the Hilo Varnish Corporation, (left) is conducting a delegation from the Paint and Varnish Association of France through his firm's Brooklyn plant. The delegates are (l. to r.) Daniel Kientz, Duroux Co.; Edmond Suchar, Novemail; Pierre Germot, Germot & Crudenaire; A. Berger, Chrome Chemicals, Johannesburg, So. Africa; and Albert Canouet, Vitex.

A. P. M. A. Scientific Award Goes to Mayo Foundation

The Mayo Foundation for Medical Education and Research receives this year's annual Scientific Award made by the American Pharmaceutical Manufacturers' Association. The award is made on the basis of "contributions to public health in the field of medical sciences." Last year's recipient was the Rockefeller Institute for Medical Research.

Directory of Corrosion Workers Being Revised

The American Coordinating Committee on Corrosion is undertaking a revision of its confidential directory of technologists actively engaged in studies on corrosion and its prevention. The committee comprises delegates from 17 major technical societies together with representatives from the principal industrial research institutes and other organizations such as the National Bureau of Standards. Its directory currently lists some 500 investigators in a diversity of specialized fields selected on the basis of questionnaires circulated to the membership of the committee's member societies. While it is felt that the directory list is relatively com-

plete there are undoubtedly individuals who were not reached in the previous circulations. Accordingly, the committee now resquests all persons actively engaged in corrosion researches who have not been contacted, to write the secretary, Professor Hugh J. McDonald, Illinois Institute of Technology, Technology Center, Chicago 16, Illinois, for further details.

Chemicals Wanted

The following chemicals are wanted by the National Registry of Rare Chemicals, Armour Research Foundation, 33 Federal and Dearborn Sts., Chicago 16:

Unsym. Tetrachloroethane
p-Tolymethyl carbinol (100 lbs.)
2-Methyl-1,3-butylene glycol
2-Methyl-1,2-butylene glycol
1,3-Pentanediol
2-Methyl-1,3-propylene glycol
1,2-Butylene glycol
Tetrabrom -o-xylene
Thujone
Pulegone
Vinyl thiophenes
2,2,3,3-Tetramethylbutane
2-Hexen-1-ol
4-Bromomethylazobenzene
Caffeic acid
Tetramethyl lead
Phthalyl bisdiethylamide (100 kg.)
Chlorobenzene-3,4-dithiol
1,2-Diaminoanthraquinone-3-sulfonic acid
Dehydro-l-ascorbic acid
Vanadium nitride
1,3-Diamino-2-propanol
Lactobionic acid

CPA Orders More Ammonia Tank Cars

To insure fair distribution of anhydrous ammonia and liquefied petroleum gas, which require high-pressure tank cars, the Civilian Production Administration is directing two of the major tank car builders to give precedence to the manufacture of more than 490 of such cars.

Precedence was necessary, CPA said, to supply cars for the transportation of anhydrous ammonia, needed for the Army fertilizer program in occupied areas, and also to transport the increased production of the liquefied petroleum gas industry. This liquefied gas is used extensively for cooking purposes in areas not served by local gas systems.

The scheduling order requires the American Car & Foundry Company during December 1946 and January 1947, to give precedence in manufacturing to 100 high pressure anhydrous ammonia cars and 200 liquefied petroleum cars, and the General American Transportation Corporation to the production of 118 anhydrous ammonia and 72 liquefied petroleum cars.

Pacific Chemical Exposition Announced for 1947

The first regularly scheduled Pacific Chemical Exposition will be presented in the Civic Auditorium in San Francisco, October 21 to 25, 1947, by the California Section of the American Chemical Society. Chairman for the exposition is Paul H. Williams, of Shell Development Company, and the manager is Marcus W. Hinson, who has handled the National Chemical Exposition for the Chicago Section since 1940.

Modys New Personnel Director of Ciba

The Board of Directors of Ciba Pharmaceutical Products, Inc., has announced the appointment of Charles S. Modys as personnel director. Mr. Modys joined Ciba on January 10, 1944 and has served as executive secretary to the Management Committee.

WAA Offers Incomplete Phthalic Plant

An incomplete industrial plant on Neville Island, Pittsburgh, Pa., planned for the production of phthalic anhydride, is being offered for sale or lease, in whole or in part, by War Assets Administration.

Construction of the plant was stopped with the end of the war, but a purchaser or lessee can complete the plant according to his own needs. The five principal structures are from 58 to 96 per cent complete.

Designed to produce 8,000,000 pounds of phthalic anhydride per year, the plant formerly was leased by the Pittsburgh Coke & Chemical Co., which owns a nearby plant.

COMPANIES

Du Pont Plans Adipic Acid Unit at Orange, Texas

The Du Pont Company announces plans for an additional unit to the Sabine River Works which is being built on a thousand acre site about three miles west of Orange, Texas. The new unit is to make adipic acid, an important component in the manufacture of nylon and will provide employment for approximately 150 persons when production starts.

In asking the approval of the Civilian Production Administration for the new project, the company said construction of

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the unit would start within 30 days after approval. Projects for units at the site to make polythene and methanol received C. P. A. approval months ago.

Nylon intermediate materials which will be made in Texas—the first unit of the Sabine River Works will not begin producing until sometime next year—will be sent to Seaford, Del., and Martinsville, Va., for further processing into yarn for the textile industry and flake for plastic articles.

Much of the Sabine River Works nylon production ultimately is destined for the new yarn plant the company is building at Chattanooga, Tenn.

Martin to Expand Vinyl Resin Plant

The Glenn L. Martin Company plans the expansion of its Painesville, Ohio, vinyl resin plant from 11,000,000 to 25,000,000 pounds per year. The present unit of 11 million pounds capacity still under construction, will be completed by April, 1947. The expanded plant will not be in full operation until early 1948, but partial operation is anticipated in the latter part of 1947.

Quaker Oats Takes Over Memphis Furfural Plant

Quaker Oats Company has purchased the war-built furfural plant at Memphis, Tennessee, which was operated by its subsidiary, the Q. O. Chemical Company, during the war. The plant will continue to supply the furfural requirements of the government rubber program, operating on approximately the same scale as for the past year. In taking over the plant the company announces that no changes in personnel are contemplated, and that present workers will become employees of the Chemicals Department, Quaker Oats Company.

While the output of this, the world's largest furfural plant, will be taken by the rubber program for the present, Quaker is actively planning for the future. Research and market development programs are under way to develop new and larger outlets for furfural in petroleum refining, wood rosin refining, plastics and chemicals and chemical derivatives. It is expected that these other uses will ultimately account for the entire plant output and even require an expansion of the facilities.

American Potash Expands Soda Ash & Borax

A $4,500,000 plant expansion in soda ash and borax production is being undertaken by American Potash & Chemical Corporation. Construction is expected to start at the company's plant at Trona, Calif., early in 1947.

The new plant will have an estimated annual production of 60,000 tons of soda ash and 30,000 tons of equivalent refined borax. In 1945 the company produced 82,000 tons of soda ash and more than 98,000 tons of borax in addition to other products.

The new plant will employ improved production methods. Secondary brine from Searles Lake, the commercial use of which substantially increases the raw material reserves of the company, will be processed for the first time in the new plant.

Sharrard Joins Westvaco's N. Y. Office

George F. Sharrard has joined Westvaco Chlorine Products Corporation, N. Y. in charge of Technical Service activities. Mr. Sharrard was previously in the Industrial Engineering Department of The Eastman Kodak Company.

Reichhold Expands Phenolic Resin Capacity

Production of Reichhold Chemicals' Plyophen line of phenolic resin adhesives and varnishes, hitherto manufactured only in the company's Detroit and Tuscaloosa plants, will be extended shortly to Reichhold plants at Seattle, Elizabeth and South San Francisco, as well.

The first year's resin production at Seattle alone is expected to be in excess of 25 million pounds, and this, together with the Elizabeth and South San Francisco outputs, plus increased production at Detroit and Tuscaloosa, should help relieve the current phenolic resin shortage.

Goodrich Enters Biochemical Field

W. S. Richardson, president of B. F. Goodrich Chemical Company, Cleveland, Ohio, announces entry of the company into the biochemical field. Extensive research and development have progressed to the stage where a number of new chemicals will soon be ready for commercial introduction, he declared. These new

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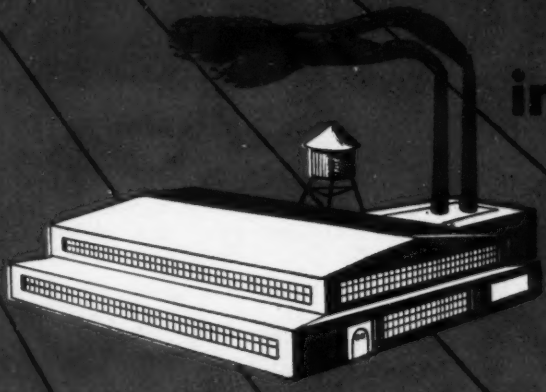

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products will take the company into the agricultural, textile, pharmaceutical, and household chemical fields.

Consistent with this announcement, Sam L. Brous, manager of sales development, has appointed Sever L. Hopperstead as service engineer to supervise the development and field work for the new biochemical products.

Monsanto Expands E. St. Louis Plant

Monsanto Chemical Company announces that it has received government approval for an estimated $4,000,000 expansion of its Monsanto, Ill., plant facilities in a program which will probably involve an eventual 200 new employees.

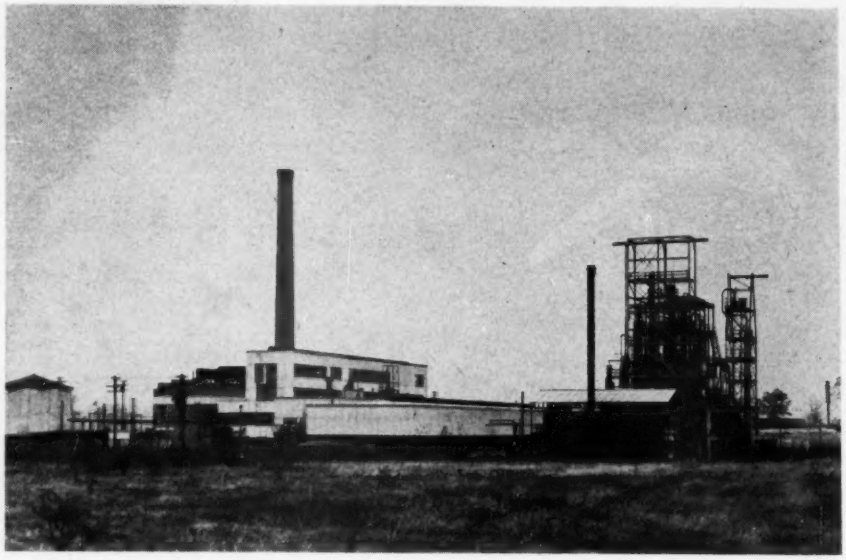
The program involves five separate projects: enlargement of chlorine and laboratory facilities, new facilities for the production of miscellaneous chemicals, an enlargement of facilities for the manufacture of wood preservatives, and expansion of the plant boiler house.

The program received recent federal approval by the Civilian Production Administration in Springfield, Ill., when it was shown that the program would not deflect essential materials from the nation's housing program.

The projects involve a cost of about $3,500,000 for new chemical machinery and about $500,000 building expenses. Approximately $1,023,000 will be paid labor for the installation of the chemical equipment and $125,000 will be paid labor on the expansion construction.

The expansion, to be substantially completed by the end of 1947, will bring greater production of synthetic detergents and chemicals for penicillin, in addition to wood preservatives and chlorine.

Heyden Starts Production At Memphis Plant



Now in operation is the Heyden Chemical Corporation's electrolytic caustic-chlorine plant purchased recently from WAA for $1,060,000. The annual capacity will be 7,000 tons of chlorine, 15,000 tons of caustic soda, and 75 million cubic feet of hydrogen. Soon to be added to the output are chlorobenzene and phenol, the latter being made by caustic hydrolysis.

Irvington Varnish Builds New Cashew Nut Shell Plant

A plant that will be used to process the oils from the shells of cashew nuts is now under construction for the Irvington Varnish and Insulator Company on a ten-acre site fronting Newark Bay. The H. K. Ferguson Company is building the plant.

The new $1,500,000 facilities will process cashew nut shell liquid to produce various products sold under the tradenames "Cardolite" and "Harvel."

The Ferguson Company is also designing and building a plant for the Irvington Company for the manufacture of "Cap-seal" products, a line of coated papers, foil and cork combinations used in sealing glass containers. This building will more than double Irvington's present capacity, which is in keeping with the expanded activities of the glass container and allied industries.

The entire project will consist of 13 buildings for manufacturing and three tank farms for the storage of chemicals and raw and processed oils. Completion is expected about February 1, 1947.

Dow Reports Profits And Wage Adjustments

Consolidated net income of The Dow Chemical Company and subsidiaries for the three months ended August 31, 1946, was $3,607,303.49 which, after providing for dividends on the preferred stock, was equivalent to $2.64 per share on the common stock outstanding. The net income was arrived at after providing $2,293,-

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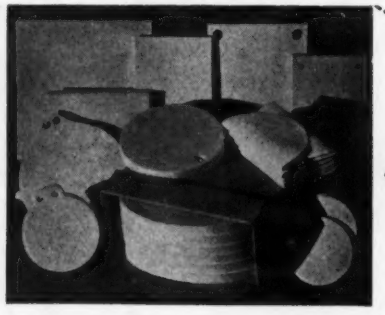

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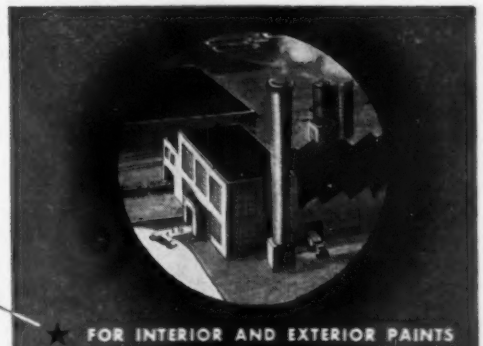

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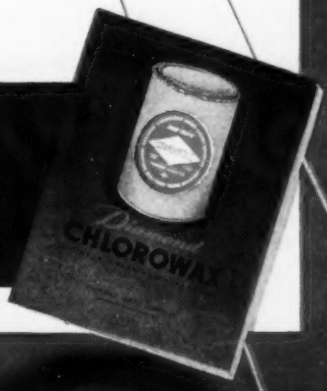

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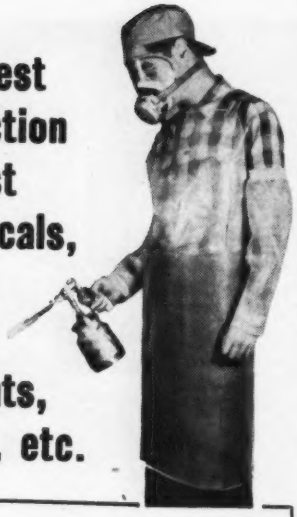

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792.68 for Federal income taxes. No dividends were received from associated companies during this quarter.

The company and the Midland Union have just agreed that, retroactive back to September 9, 1946, wage payments at the Midland plant will be increased approximately $1,200,000 a year for portal-to-portal wages. The agreement also provides for payment for the past six years portal-to-portal wages plus certain veteran benefits, of approximately $4,650,000 before tax adjustments. The effect on the company's earnings for the three months ended August 31, 1946, has not been computed.

Speel Joins Alrose

Henry C. Speel, formerly with General Mills of Minneapolis, has joined the staff of the Alrose Chemical Company, Providence, Rhode Island.

New Florida Plant For Inter. Min. & Chem.

International Minerals & Chemical Corporation has completed negotiations for the purchase of 10 acres of industrial property in Pensacola, Florida, upon which it expects to begin construction shortly of a fertilizer plant.

For the past 12 years the company has been using leased facilities from the Louisville & Nashville Railroad Company in which it has been conducting its manufacturing operations. The new plant is being constructed to provide for more efficient operations and greater output with which to take care of increased business in that region.

The new building will be 180 feet wide by 210 feet long and is expected to be completed by June 1947. It will be capable of producing 20,000 tons of mixed fertilizer annually.

Merck to Built New Vitamin B_6 Unit

A new manufacturing unit for the production of vitamin B_6 will be erected at Elkton, Virginia, according to George W. Merck, president of Merck & Co., Inc. Approval for the $295,000 four-building unit was granted by the Civilian Production Administration at Richmond, Virginia.

"Total cost of the new plants," Merck said, "will be in the neighborhood of $1,500,000 of which by far the greatest expense will be for equipment. There will be two process buildings, one of which is already constructed; a cooling tower and reservoir; and a small, one-story refrigeration building.

Known chemically as pyridoxine hydrochloride, vitamin B_6 has various important medical uses. It is extensively used to prevent the dread radiation sickness which often results from radiation treatment of malignant diseases. Small doses have been found to completely prevent radiation sickness in 75 per cent of the cases.

Vitamin B_6 also has been found effective in the prevention and treatment of nausea during early pregnancy. Although found in many food substances, inadequate intake often leads to vitamin deficiencies. While the specific function in nutrition has not been determined, medical practice will not permit its omission for fear of losing important characteristics still unknown. In addition, there are numerous laboratory indications that Pyridoxine Hydrochloride may have a beneficial effect on skin diseases and tissue growths.

Westvaco to Produce Hexachlorcyclohexane

Westvaco Chlorine Products Corporation, New York, has completed facilities for substantial production of hexachlorcyclohexane at its South Charleston, W. Va., plant. Westvaco expects to attain quantity production of hexachlorcyclohexane on or about January 1, 1947.

Standard of California Profits Top Last Year

Standard Oil Company of California shows third quarter net profits of $17,736,397 on a gross operating income of $99,946,739 after the provision for $4,000,000 toward income taxes. The company's net earnings, sales and taxes are all running ahead of 1945 for both the third quarter and for the entire nine-months period through September 30, 1946.

New Debentures to Finance Monsanto Expansions

A 25-year debenture issue to provide $30,000,000 for Monsanto Chemical Company's expansion program, has been placed privately with a group of five insurance companies, Edgar M. Queeny, chairman of the board of directors, informed stockholders in his quarterly report.

The debentures, sold at par, will bear 2.65 per cent interest and will become due November 1, 1971. The proceeds obtained will provide funds for the $10,000,000 purchase from the War Assets Administration

No Increase in Nacconol Prices!

Amidst the confusion of all the recent price increases, we are pleased to announce a continuation of National Aniline's unwavering policy in connection with Nacconols:

"NO INCREASE IN PRICE"

This follows a policy of continual price reductions over the past 15 years and today, despite largely increased wage and raw material costs, our price is one-third its original level.

Customers can be assured of our rigid adherence to the policy of consistently passing along the benefits of superior quality and lower prices resulting from larger production and improved chemical technology.

New plants are under construction and more capacity will be available next year.

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of the styrene plant at Texas City, Tex., which Monsanto designed and constructed for the synthetic rubber program. The remainder of the sum will be used for payment of other manufacturing facilities for which commitments have been made. A sinking fund beginning after ten years will be scheduled to retire half of the issue by maturity.

Kellogg Forms Glyceride Process Division

The M. W. Kellogg Co. has announced the formation of a Glyceride Process Division to carry out the development of new processes and new products from animal fats and vegetable oils. H. B. Larner has been appointed sales manager of the new division.

International Min. & Chem. Builds Sulfuric Plant

Construction has just started by International Minerals & Chemical Corporation on a new sulphuric acid plant as an addition to its present commercial fertilizer plant at Spartanburg, S. C. The new addition is expected to be ready for operation by June, 1947.

The new plant will enable the company to furnish all the necessary raw materials that it uses in the manufacture of its superphosphate at Spartanburg. The company already mines its own phosphate and potash. At present, its manufacturing facilities in Spartanburg include an acidulating plant and a mixing plant.

When operating at full capacity, the new plant addition is expected to produce about 20,000 tons of sulphuric acid annually.

Celanese Profits Double Last Year

Net profits of Celanese Corporation of America for the first nine months of 1946 were more than double those of a year ago, according to the company's interim report sent to stockholders by Harold Blancke, president. The profit for the period amounted to $11,573,513 after all charges and taxes, against $5,630,340 in the first nine months of 1945.

Based on the 5,514,107 shares of common stock which were outstanding on September 30 last after the recent 2½ for 1 split, the first nine months' profits were equivalent, after preferred dividends, to $1.68 a common share. On the same basis, profits for the 1945 period were equal to 65 cents a common share.

For the third quarter of 1946 the consolidated net profit amounted to $4,129,109 after all charges and taxes, contrasted with $4,010,290 for the three months ended June 30, 1946, and $1,830,622 for the third quarter of 1945. Earnings for the third quarter of 1946 were equal, after preferred dividends, to 61 cents a share on 5,514,107½ common shares, compared with 58 cents a share on the same basis in the second quarter.

Gross sales of Celanese Corporation of America for the three months ended September 30, 1946, amounted to $34,400,747. This brought the gross sales volume for the first nine months of the year to $99,064,128, which contrasted with $77,818,151 i the corresponding period last year.

Air Reduction Reports 3rd Quarter Earnings

The Air Reduction Company reports net profits of $1,327,846 for the third quarter of 1946. Gross sales and income taxes for the period were $18,237,755 and $872,819, respectively. While the third quarter earnings for 1946 surpassed those for the same period last year, the current year to date is slightly behind 1945.

Reichhold Acquires Land For Further Expansion

Reichhold Chemicals, Inc., has just purchased 680 acres at Tuscaloosa, Ala., 21 acres at Elizabeth, N. J., and 5 acres at South San Francisco, Calif., in all of which cities Reichhold plants are now operating. 110 acres have also been acquired at Philadelphia, Pa.

According to Henry Reichhold, board chairman, this acreage will afford sites for additional plants devoted to the pro-

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$(C_6H_5)_2C(OH)COOH$ M.W. 228.1

SPECIFICATIONS:

Fluffy, white, odorless powder, soluble in hot water, alcohol, ether and acetone. Assay, min. 99.0%; M.P. 150.0 ±1.0°C.; Loss on drying, max. 0.5%; Ash, max. 0.1%; free from chlorides and sulfates; Heavy metals, less than 20 ppm.

DIPHENYLACETIC ACID

$(C_6H_5)_2CHCOOH$ M.W. 212.2

SPECIFICATIONS:

Fine white, odorless crystalline powder, soluble in alcohol and dilute alkali. Assay, min., 99.0%; M.P. 149.0 ±1.0°C.; Loss on drying, max. 0.5%; Ash, max. 0.1%; free from chlorides and sulfates; Heavy metals, less than 20 ppm.

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These intermediates are finding increased use as starting materials for the manufacture of a host of physiologically active derivatives, especially in the synthesis of antispasmodics, anticonvulsants, sympathomimetic agents, and as adjuncts in the manufacture of antibiotics.

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duction of synthetic resins, chemical colors and phenolic plastics, as well as new RCI chemical developments, details in regard to which are not yet available for publication.

Du Pont Again Expands Titanium Pigments

Plans for a new manufacturing unit at the Du Pont titanium dioxide plant at Edge Moor, Delaware, are being made by the company's Pigments Department.

This unit is the second Du Pont titanium expansion to be started since the end of the war and the seventh major expansion in this field which the company has undertaken since it started the manufacture of titania in 1931. Approval of the new project has already been obtained from the Civilian Production Administration. Much of the equipment to be installed cannot be procured except under long-term delivery, so completion is not contemplated until sometime in 1948.

Currently the plant's capacity is being increased through modification of existing equipment and processes. This work was begun last Spring. Completion of this phase of the expansion program is scheduled for next May.

International Fertilizer Buys California Dehydrating Plant

A vegetable dehydrating plant in Bakersfield, Calif., operated during the war by the Kern Dehydrating Co., is sold for $24,150 cash to the International Fertilizer and Feed Co., War Assets Administration announced today. The sale covers all land and buildings, WAA said, as well as the ruins of the plant's main operating building which, with machinery and equipment, was destroyed by fire in September 1945.

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Lalonde Transferred by H-VW-M Company

Paul J. Lalonde has been transferred from chemical research activities to engineering service and development for the electrotypers' and stereotypers' industry served by the Hanson-Van Winkle-Munning Company.

Phillips 3rd Quarter Profits Better 1945

Phillips Petroleum Co. made a net profit for the third quarter of 1946 of $6,760,974 after the allowance of $2,696,100 for income tax. Gross income for the period was $59,928,708. The corresponding figures for 1945 were $4,317,551, net profit; $1,136,200, taxes; and $57,211,235. The total figures for the first nine months of 1946 are slightly below 1945 thus far.

Du Pont Opens Grasselli Office at Minneapolis

Clarence A. Falk of Chicago and Thomas J. Desmond of Milwaukee have been appointed sales representatives for Grasselli acids, chemicals, insecticides, and agricultural proucts, it was announced by George D. Wilson, manager of the new Du Pont district office which is opening in Foshay Tower.

Both Mr. Falk and Mr. Desmond will make their headquarters in Minneapolis and travel in Minnesota, upper Wisconsin and the Dakotas.

Yeast Plant to Be Built By Wisconsin Paper Firms

A $400,000 yeast manufacturing plant will be built at Rhinelander, Wis., and the product will be made with the use of

A WELL KNOWN PRESERVATIVE...A VALUABLE INTERMEDIATE

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Inspection and analysis of all purchased raw materials in a special laboratory is the first in a series of careful checks and controls to assure high purity of Hooker chemicals.

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It is this same consistent high purity as well as its chemical activity and ease of handling that has made it an increasingly useful chemical intermediate particularly in the preparation of dye-stuffs and medicinals. Available in U.S.P. or Technical grades.

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Metanitrobenzoyl Chloride
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Caustic Soda Paradichlorbenzene Muriatic Acid Chlorine Sodium Sulfide Sodium Sulfhydrate 3116

a newly developed process, utilizing a by-product of sulphite pulp production. This announcement comes from John G. Strange, secretary of the Institute of Paper Chemistry.

The spent cooking liquor from the pulp mills in that area will be the raw material for yeast making, the process being an outgrowth of a cooperative research program started in 1939, by a group of sulphite pulp producers operating thirteen paper mills in northern Wisconsin and Michigan. The real object of the research work originally was merely to make use of the waste sulphite liquor which had been discharged from the paper mills into nearby streams, causing stream pollution. Now this by-product of the waste is to produce yeast of good quality and at reasonable cost.

The officers of the new company, to be known as Lake States Yeast Corporation, will be Folke Becker, of Rhinelander, president; Stanton Meade, Wisconsin Rapids, vice-president, and John G. Strange as secretary and treasurer.

The plant construction is to start as soon as building restrictions are lifted.

Pennsalt Earnings Up; Directors Reelected

Consolidated net earnings after deduction of Federal taxes of the Pennsylvania Salt Manufacturing Company for the 12 months ending Sept. 30 were $1,790,863.77 or $2.39 per share on 750,000 shares of $10 par stock, Leonard T. Beale, president, announced after the annual meeting of shareholders October 23, in the company offices.

The net earnings for the same period ending Sept. 30, 1945, were $1,356,296.98, equivalent to $1.81 per share, Mr. Beale reported.

At the annual meeting, Leonard H. Kinnard, Charles G. Berwind and Richard T. Nalle, all of whom have been directors of the company, were re-elected for three-year terms. Alexander J. Cassatt, also a director of the company, was elected to a one-year term.

CPA Approves $39 Million Plant for Celanese

Celanese Corporation of America has received CPA approval for the construction of a $39 million acetate rayon plant at Rock Hill, S. C. Construction will begin before the end of the year and will involve the expenditure of about $10 million for buildings and the balance for equipment. It is currently anticipated that the plant will be completed in the latter part of 1948 when it will employ about 6000 workers. The capacity of the plant will be one million pounds a week.

This is the largest plant approved by the CPA in many months. Approval of the project was influenced by the shortage of textiles and by the serious unemployment situation in the Rock Hill area.

Texas Gulf Sulphur Reports High Earnings

For the three months ended September 30 the Texas Gulf Sulphur Company reports net earnings of $4,249,886 on gross sales and other revenues of $11,173,710. Federal and foreign income taxes amounted to $1,842,000. Earnings higher than normal are explained by the fact that the company supplied practically all the requirements of the Sulphur Export Corporation for its sales made abroad. The usual proportion of Export's requirements from Texas Gulf is 50 per cent. This exceptional condition of nearly complete supply of Export's shipments is expected to prevail throughout the balance of 1946.

Lower Taxes Boost American Cyanamid Profits

American Cyanamid Company's profits for the first nine months of 1946 are $5,635,339 as compared to $3,989,607 for the same period last year. A decrease in Federal and foreign income taxes from $8,800,000 in 1945 to $4,400,000 in 1946 permitted an increase in common stock dividends even though the operating income before taxes was smaller in 1946.

New Plastics Corp. Offers Preferred Stock Issue

The New Plastics Corporation, through Grimm & Co. is publicly offering 30,000 shares of 60c cumulative preferred stock, $2.25 par value, at $9.75 per share. Proceeds of the issue which represents new financing, will be used to purchase new facilities and to make alterations; to re-

HERE... dependability is made!
NIACIN — commercial quantities.
THIOVANOL (Vacuum distilled thioglycerol) — commercial quantities.
DITHIODIGLYCOLIC ACID — pilot plant quantities.
THIOVANIC ACID (Vacuum distilled thioglycolic acid) — commercial quantities.
In the compounds we market under our own name . . . in the special chemical compounds and consumer chemical preparations we make for "private label" distributors . . . the Evans Chemetics seal is recognized as the standard of quality and dependability. Whether it's your formula and method or ours . . . whether it's quantity production or experimental quantities . . . our facilities and economical "know-how" are yours to command.
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Baker's 2,4-D

KILLS COSTLY WEEDS—HELPS BUILD VALUABLE PASTURAGE—GIVES MORE GRAZING PER ACRE!

Off-flavor milk is costly. Every year milk plants and creameries reject or degrade a large quantity of milk and cream with weedy flavors. It costs dairymen millions of dollars.

To prevent off-flavors in milk, cows must be taken off pastures containing "flavor weeds" four hours before milking—in some cases longer. This means considerable loss of valuable pasturage to the dairyman.

Many of the troublesome weeds which cause off-flavors in milk can be killed with 2,4-D—wild onion or garlic, bitterweed, French weed, dog fennel, ragweed, shepherd's purse, wild mustard, and pepper grass.

Killing these weeds makes more pastures available for the dairy herd and reduces off-flavor milk losses to the minimum.

To those who formulate weed killers, here is a real opportunity to create sales. The J. T. Baker Chemical Company supplies your needs two ways—raw materials for manufacturing weed killers such as acid 2,4-D and the sodium salt of 2,4-D, which is water soluble.

OR, you can obtain Baker's 2,4-D formulated concentrates which are ready for dilution by the consumer and ready for your trade-mark and label.

Whether you are interested in either or both, write for further facts and prices. Address Organic Chemical Division, J. T. Baker Chemical Co., *Executive Offices,* Phillipsburg, N. J.

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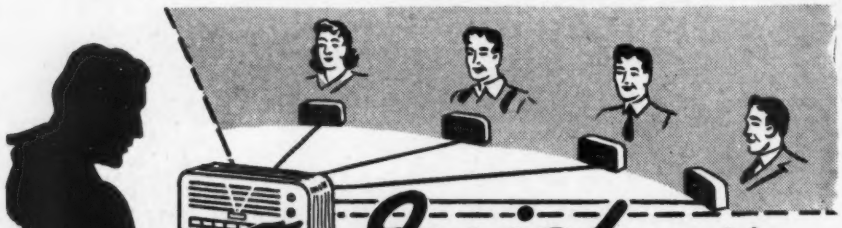

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tire certain bank obligations; and, to increase working capital.

Atlas Earnings Continue Up

Earnings for the third quarter of 1946 for the Atlas Powder Company netted $295,308 after the allowance of $236,000 for Federal income taxes. Gross sales and revenues were $8,445,175 for the same period. Sales and profits have increased in each successive quarter through 1946.

Harvey Transferred by Hall Laboratories

J. Mylan Harvey transferred from Pittsburgh to Cleveland field service staff of Hall Laboratories. Working with the C. H. Tate Co., Hagan representatives, he will continue the same work with steel, rubber, paper, chemical, match and textile industries of the Cleveland area.

Company Notes

MONSANTO CHEMICAL COMPANY has opened a sales office in the Keith Building, Cleveland, O., to serve the greater Cleveland area.

Robert H. Baugh will supervise the office and represent Monsanto's phosphate division sales in the area. T. C. Tupper will represent the company's organic chemicals division, and R. T. Clark the Merrimac division.

N. I. MALMSTROM & COMPANY announces the opening of its new office and warehouse at 30 West Washington Street, Chicago 2, Illinois.

The STANETAL CORP. has moved into their new plant at Linden, N. J., where it will manufacture fine organics and pharmaceuticals.

NATIONAL STARCH PRODUCTS, INC., has its English and Dutch plants in full operation again. The Dutch plant which processes potatoes principally for export re-

Church & Dwight Co., Inc.

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Standard Quality

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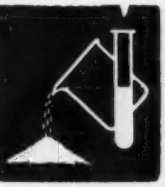

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Palmalene's specifications (see below) make it suitable for many uses. It is excellent as a replacement for Stearic Acid in rubber compounding; and is especially suitable for textile specialties, soap making, alkyl resins, wetting agents, cosmetics, kier assistants, driers, pulp manufacture and paper manufacture.

PALMALENE SPECIFICATIONS

Saponification Number	180-185
Iodine Value	55-60
Titre	35

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HEARTY GREETINGS *and Most Cordial Good Wishes for a Merry Christmas and a Prosperous New Year from the Officers and Staff of*

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ports a satisfactory crop this season and anticipates that there may be some relaxation of export limitation.

EUREKA LABORATORIES, INC., is a new firm in Dallas, Texas, currently making a special dye for plastics. This firm was formerly a division of the Southwestern Plastics Co., Inc.

Production of ammonia for use in fertilizer for foreign sale is under way at the Morgantown Ordnance Works. More than half of the anhydrous ammonia to be produced for the Government program aimed at supplying fertilizer nitrogen for export, will be turned out at the $60,000,000 wartime plant. Officials of the HEYDEN CHEMICAL CORPORATION, which is operating the ammonia facilities for the Army Ordnance Department, said that production will be increased continually until the capacity of the plant is reached. In less than three months, a force of more than 900 men has transferred the plant from a standby to an operating status.

The Paterson, New Jersey, plant of ULTRA CHEMICAL WORKS, INC., is now being enlarged in accordance with a long-range program of expansion and modernization. A feature of the newly completed Detergents Division building is the recently installed spray dryer, six stories high.

Other buildings in the Paterson plant will house administrative offices and new, modern laboratories, to be supplied with the most up-to-date equipment. All buildings are planned for the latest developments in plant machinery—for the purpose of improving techniques and speeding production.

When completed according to plans, the entire new plant will occupy an area of 50,000 square feet.

The H. H. Rosenthal Co. has been absorbed by the newly formed ROSENTHAL-BERCOW CO., INC. The management and personnel remain the same.

PERSONNEL

Bunce to Manage Hercules Burlington Plant

Donald A. Bunce has been appointed manager of the new Burlington, N. J., chemical plant of Hercules Powder Company. Now superintendent of the Synthetics Department plant at Mansfield, Mass., he will assume his new duties January 1, 1947.

The Burlington plant, to produce synthetic resins and other chemicals, is scheduled for completion by January. It will employ about 200 persons.

Mr. Bunce formerly served with the Providence Drysalters Company at East Greenwich, Rhode Island, as chemist.

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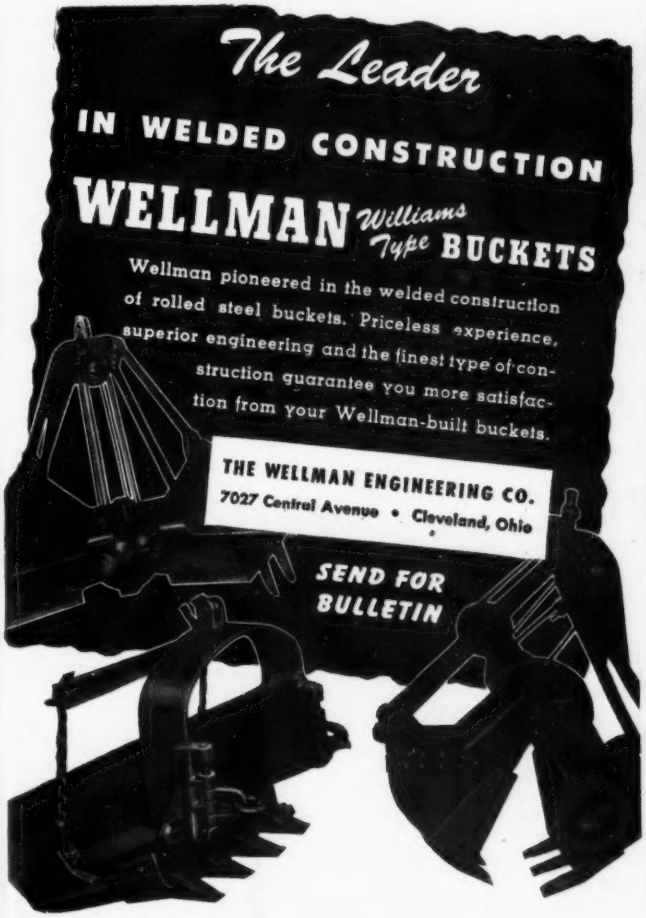
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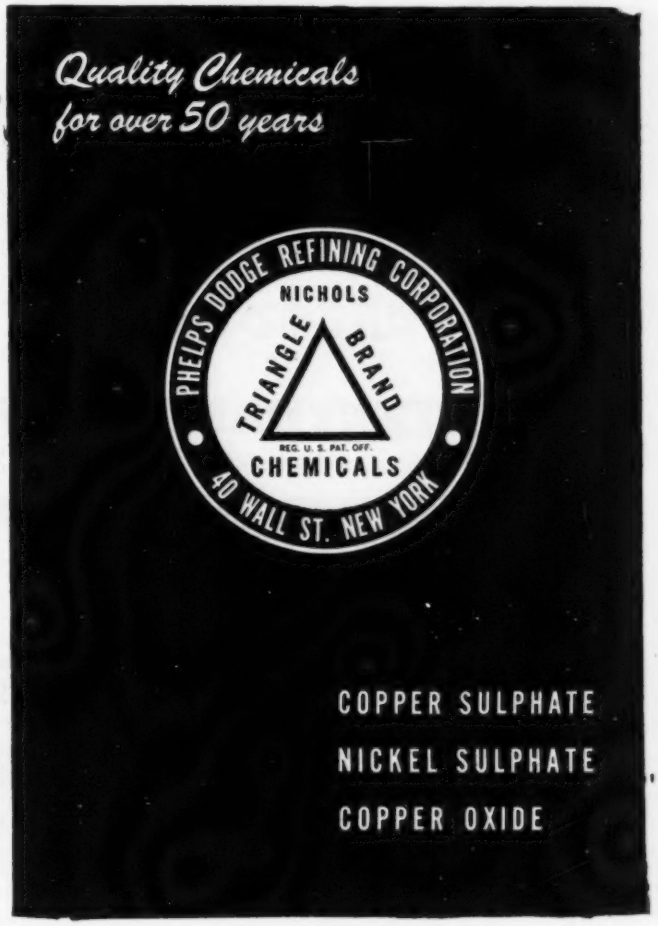
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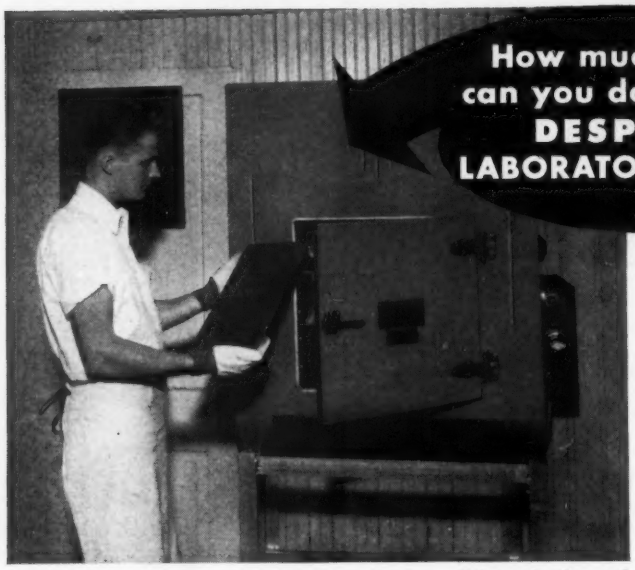

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Makers of Fine Chemicals and Pharmaceuticals

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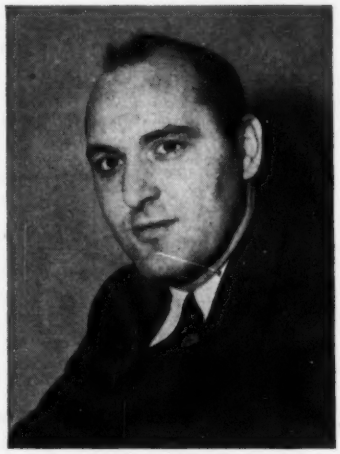
When the East Greenwich plant was purchased by Hercules Powder Company in 1936, he joined the company as chief chemist and later became superintendent of that plant.

During World War II Mr. Bunce was appointed acid area supervisor at the Hercules-operated Volunteer Ordnance Works at Chattanooga, Tennessee. He returned to New England as superintendent of the Mansfield plant in October, 1943.

Boger Made Medical Director of Sharp & Dohme



Sharp & Dohme has announced the promotion of William P. Boger to the position of Associate Medical Director. Before joining Sharp & Dohme as Assistant Medical Director in July 1945, he was Medical Director and Internist at St. Luke's Hospital, Bluefield, West Virginia. Dr. Boger is a Diplomate of the American Board of Internal Medicine.

Lathe Heads New Lecithin Sales Division of Glidden

The formation of a Lecithin Sales Division of the Glidden Company has been announced under the direction of J. H. Lathe. Mr. Lathe was formerly Western sales manager of Glidden's chemical and pigment products.

Blitz Made Calco Plant Engineer at Willow Island

The Calco Chemical Division, American Cyanamid Company, has announced the appointment of Baxter Blitz as resident engineer at the company's Willow Island Works. During the war Mr. Blitz was with the Vanadium Corporation of America at Monticello, Utah.

Commercial Solvents Advances Curll

Daniel B. Curll, Jr., formerly assistant to Henry W. Denny, Vice President in Charge of Sales, has been appointed Sales Manager of the new Dixie Chemi-

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GUM ARABIC BLEACHED
GUM GHATTI
GUM KARAYA (Indian)
GUM TRAGACANTH
GUM EGYPTIAN
GUM LOCUST (Carob Flour)
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(CRUDE, POWDERED)
Chemicals and Oils

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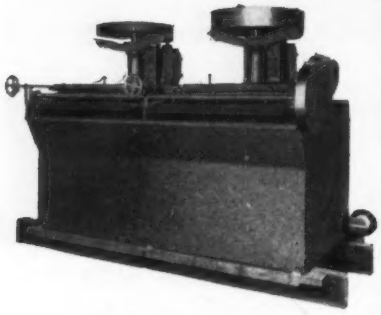
In the Massco-Fahrenwald Flotation Machine



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The advantages of this machine are: (1) Greatly increased aeration; (2) More air per unit of power input; (3) Better diffusion and more uniform distribution of air; (4) Remarkable ability to increase aeration with feed overloads; (5) Easier servicing; (6) Increased life of parts.

The basic improvements in flotation performance of this machine hinge upon the fact that air and pulp are introduced separately instead of together. The Massco-Fahrenwald Flotation Machine was designed by Dr. A. W. Fahrenwald, one of the world's topmost authorities on ore beneficiation by flotation.

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cals Division of Commercial Solvents Corporation. The new division will handle anhydrous ammonia and other chemicals produced at the Sterlington, La. plant recently purchased by the company from the War Assets Administration.

Frank E. Maple, formerly in the Technical Service Division of Commercial Solvents at Terre Haute, Ind., now is Assistant to the Vice President in Charge of Sales at New York.

Askin Becomes Director of Purchases for Heyden

Appointment of Simon Askin as Director of Purchases to succeed Robert P. Gould, retired, has been announced by the Heyden Chemical Corporation of New York. In his new post, Mr. Askin will have charge of all purchases, including raw materials and equipment.

Mr. Askin is Assistant Secretary and Assistant Treasurer of the Corporation, and is located at their main office at 393 Seventh Avenue, New York, N. Y.

Sherwin-Williams Advances Donald Kohr, Jr.

D. A. Kohr, Jr., director of The Sherwin-Williams Co. emulsion research laboratory in Chicago since 1944, is now Technical Director of Special Chemical Products. In his new capacity, Mr. Kohr will be in charge of research and the development of the company's line of special chemical products.

NEWS *of* SUPPLIERS

The formation of the **Taco West Corporation,** 2620 South Park Avenue, Chicago, Illinois has been announced. The new company will manufacture and market automatic electronic control devices in the fields of combustion control, gas analysis, pyrometry, process control and allied apparatus. Officers of the corporation include Theodore A. Cohen, President, who was formerly Vice-President, of the Wheelco Instruments Company. Mr. Richard K. West, Secretary-Treasurer of the corporation, was formerly engineering representative for the Bakelite Corporation and liaison engineer for Bell Aircraft.

Niagara Filter Corporation of Buffalo, New York, has appointed Lester C. Books to its Sales Engineering Staff serving the Philadelphia, Wilmington, Baltimore, Washington and Eastern Pennsylvania and Norfolk area. Mr. Books returns to this area after two years with Niagara Filter's home office sales engineering staff in Buffalo.

H. K. Porter Company, Inc. announced that it was moving its two Quimby Pump manufacturing operations in New Jersey to be centralized in the company's plant at 49th and Harrison Sts. in Lawrenceville, Pa. The Quimby Pump Company, Inc. was established in New York in 1893 and subsequently moved to its New Jersey plants, one in Newark and one in New Brunswick. During 1943 the Quimby Pump Company was acquired by H. K. Porter Co.

The Permutit Company has acquired to Simplex Valve and Meter Company of Philadelphia. H. W. Foulds, Permutit President, succeeds W. H. Roth as President of the newly-acquired subsidiary, while Mr. Roth becomes the Simplex Board Chairman.

The Steel Improvement & Forge Co., Cleveland, Ohio, announces the establishment of a Turbine Forgings Division. Mr. Carl I. Schweizer, as Chief Metallurgist, is in charge of this division.

Arthur Zimmerman has been appointed Sales Manager of **The Steel Improvement & Forge Co.,** Cleveland, Ohio. Mr. Zimmerman was formerly associated with The Weatherhead Com-

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Aqua Ammonia
Anhydrous Ammonia
Yellow Prussiate of Soda
Calcium Ferrocyanide
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HENRY BOWER CHEMICAL
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29th & GRAY'S FERRY ROAD PHILADELPHIA, PA.

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Hydrazine Sulphate
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Hydrazine Hydrate
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STANDARD AND POWDERED

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CERESINE

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pany, Cleveland, as Assistant Chief Engineer, and lately had been active in sales and engineering work in connection with gas turbine accessories.

J. C. Lungerhausen has joined the engineering staff of the **Bowser, Inc.**, Industrial Pump Division, Fort Wayne, Indiana, in the capacity of Chief Development Engineer. For the past five years he has been Development Engineer for the Blackmer Pump Company, Grand Rapids, Mich.

A large expansion program now is in the process of completion by **Niagara Filter Corporation** of Buffalo, New York. Officials of the company state that this year's business volume will approach three times the 1945 total. The present expansion move is calculated to permit the company to handle in 1947 twice as much business as this year. Niagara has acquired new plant facilities which will almost double existing space, has increased its working force 100 per cent and installed a number of new machines calculated to really speed production.

War Assets Administration has approved sale of a glass tubing plant at Parkersburg, W. Va., to **Demuth Glass Works, Inc.**, wartime lessee, for $225,000. The purchaser will continue in the production of glass tubing, employing about 150 persons.

Labor Relations

(*Continued from page 1032*)

the same clock it would require 8 minutes to go through the line. This variable and indeterminable "waiting time" was not held to be compensable working time, but the time required to walk directly to the place of productive work, and the preparation time—changing clothes, sharpening tools, etc.—was held to be compensable work time. This time averaged between 2 and 12 minutes, each way, depending on the different places of work.

The court admitted that if this walking and preparation time was a matter of less than a few minutes, it might not be considered, but in this case it was enough to constitute working time which had not been paid for.

Comment

These decisions, and the use that labor union leaders propose to make of them, emphasize again the need of accurate definition of working time in union labor contracts—not to mention in the law itself.

Some interpreters of these decisions hold that the time required for changing clothes, etc., would not be counted as compensable working time unless such change was required by the employer or the nature of the work. However, the court decision states specifically that these preparatory activities involved "exertions of a physical nature, controlled or required by the employer and pursued necessarily and primarily for the employer's benefit. They were performed solely on the employer's premises and are a necessary prerequisite to productive work. There is nothing in such activities that partakes of the personal convenience or needs of the employees."

From that reasoning it would seem safe to assume that in any job where the employee wanted to save wear and tear on his street clothes, he would be accorded the privilege of changing them on company-paid-for time.

PETROLITE

Crown Quality WAXES

FOR BETTER PRODUCTS FOR SURPRISING ECONOMIES

Crown Quality Waxes are highly-refined micro-crystalline mineral waxes, manufactured from selected crude stocks—in a refinery devoted exclusively to the production of fine waxes.

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While Crown Waxes are suitable for blending with vegetable or natural waxes, they are in themselves high quality products—suitable for many applications.

•

Crown Waxes, now available to industry, were developed to meet the exacting needs of war by the Petrolite Corporation—an organization thoroughly experienced in petroleum technology.

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Manufacturers using wax in their formulations or processes should carefully note these Crown Wax Specifications.

Crown Quality Index	Penetration	Minimum Melting Point °F	Color
1035	Under 2	195	2 to 2½ NPA
1010	Under 2	195	1 to 1½ NPA
700	Max. 5	197	2 to 2½ NPA
500	5 to 10	192	2½ to 3 NPA
400	5 to 10	192	4 to 5½ NPA
200	5 to 10	192	Brown-Black
100	5 to 8	196	Black

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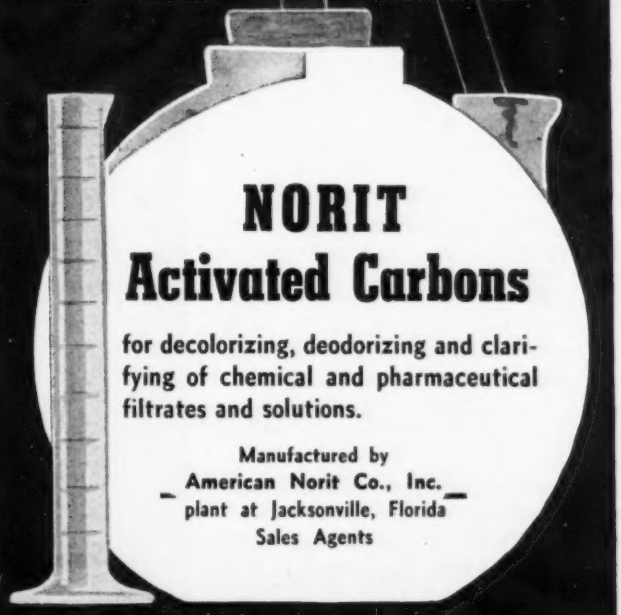

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CHEMICAL SPECIALTIES

A department devoted to news of the chemical specialties field. Descriptions of new specialty products will be found in the New Products & Processes department.

Phenothiazine Used As Insecticide for Codling Moth

Phenothiazine, the chemical compound that is used to control internal parasites in animals, has found a new field—as an insecticide for the control of the codling moth.

Combined with lead arsenate, phenothiazine has given outstanding control of this pest in experiments and demonstrations in Pennsylvania, Virginia, West Virginia, Maryland, Delaware, and New Jersey. Tests are being run in New York and other apple-growing states.

Dr. H. M. Steiner, until recently entomologist of the Pennsylvania Experiment Station, reports that growers in the south-central part of the state last season used 70,000 pounds of agricultural grade phenothiazine with lead arsenate, largely in the middle three of the first five sprays applied after petal-fall.

Du Pont's Grasselli Chemicals Department entomologists recommend using a specially prepared mixture of 2 pounds of agricultural grade phenothiazine combined with 3 pounds of standard lead arsenate in water to make 100 gallons of spray. Users are cautioned that phenothiazine will cause skin irritation to some persons. Contact with the skin and inhalation of the dust should be avoided.

Propose Use of Plastics In Auto Glazing

Broadening of American Standards Association code requirements covering automotive safety glass to facilitate the use of plastics for motor vehicle glazing installations other than windshields has been recommended by the Society of Automotive Engineers.

The committee, composed of SAE members and of other engineering experts from the automobile, glass, and plastics industries, has reported that varied and exhaustive tests lead to the conclusion that, with the approval of state legislative and administrative agencies, synthetic plastic materials may be used, either singly or laminated, for motor vehicle windows.

Recommendations accompanying the report establish certain physical requirements for plastics, such as limitations upon distortion or other interference with vision, strength, and clarity which might be caused by temperature changes or the action of chemicals used in cleaning. The recommendations further advocate that the proposed code revisions be made part of no state law, nor of the equivalent thereof, for fear that rapid technical progress in the plastics industries might be handicapped.

In advising against the use of plastic windshields, the report explains that no plastic materials currently available satisfactorily withstand the abrasive abuse to which windshields customarily are subjected, and recommends the continued installation of laminated safety glass.

New Fungicide and Spray Adjuvant

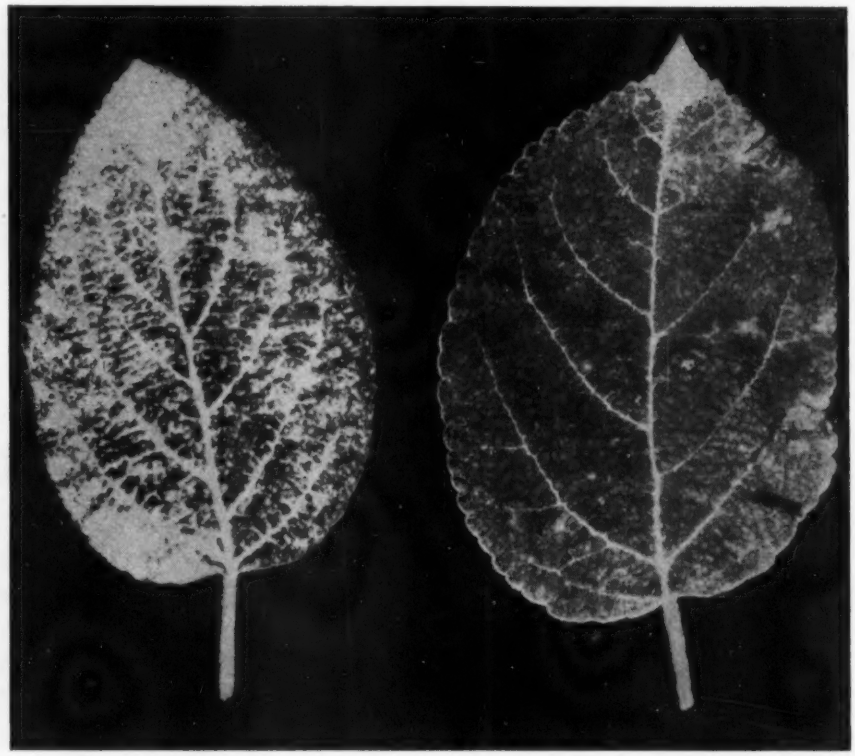
A new spray material is now commercially available that does not wash off in rain or dew, has definite fungicidal properties in itself, is an air-drying adhesive which can be used as a carrier for insecticides and other accepted fungicides, and can be used in any standard spraying equipment. The material, Good-rite polyethylene polysulfide, is manufactured by B. F. Goodrich Chemical Company, Cleveland, Ohio.

Field tests carried out for several years in varying climates and growth conditions show that the combination of properties possessed by polyethylene polysulfide—abbreviated, p.e.p.s.—is valuable for a large number of crops.

Derived from petroleum and sulfur, p.e.p.s. is a synthetic rubber-like latex not much different physically from the many synthetic rubbers now on the market. Once dried, it is removed only by scraping, chemical decomposition of the polymer or by growth expansion. It is stated that with spray applications discontinued six weeks before harvest, no odor, taste, or other undesirable evidence of the deposit remains on fruit or vegetables to cause problems in the preparation for market.

When sprayed on plants p.e.p.s. forms microscopic, non-phytotoxic, elastic networks which are insoluble in water and oil, and are strongly adhesive for plant surfaces. The polyethylene polysulfide molecule is large and has no appreciable solubility in either the aqueous or lipid phases of cell membranes. According to the manufacturer the new material does not appear to interfere with the normal leaf functions of photosynthesis, respiration, and growth. Furthermore, it is understood that it does not volatilize and injure plant tissues in hot weather.

As an adhesive for standard insecticides, p.e.p.s. has been used as a carrier and adjuvant with fungicides such as Bordeaux, sulfur, and lime-sulfur, and with insecticides such as lead arsenate, lime, fixed nicotine, nicotine sulfate, D.D.T. or combinations thereof. P.e.p.s. has also



Demonstrating the adhesive character of polyethylene polysulfide, the two leaves above were exposed to six weeks of weathering with 9.7 inches of rain after each had been sprayed with a dispersion of sulfur (10 pounds per 100 gallons of water). Spray used on the leaf at the left contained two pounds of p. e. p. s. per 100 gallons of water in addition to the sulfur. Rain washed the spray off the leaf at the right, but not from that at the left.

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been used with some copper and zinc compounds and also with oil sprays.

Watkins Doubles Laboratory Space At Rahway Plant

The R. L. Watkins Company Division, Sterling Drug, Inc., has doubled the space of its control laboratory in its Rahway plant, according to D. H. Williams, vice-president. Equipment is now being installed. The laboratory is designed to insure scientific chemical control of all raw materials, production, and finished stock.

Improved Color Film Developer

The Ansco Division of General Aniline and Film Corporation announces an advance in color film processing in the form of a new color developing agent for color films and color paper.

It is well known that the color developing agent, presently used in current color photographic processes, has the disadvantage of causing a minor skin irritation or dermatitis with certain individuals who are sensitive to it. This annoyance is eliminated by the use of the new developing agent, which without any sacrifice in color quality, is free of this property, being no more toxic than the developers used in ordinary black and white photography.

Household Dye Industry To Set Trade Rules

Representatives of the household dye industry held the first trade practice conference conducted by the Federal Trade Commission under a new plan which places greater emphasis on the elimination of unfair trade practices through cooperative means.

Commissioner Lowell B. Mason, presiding at the conference, said:

"President Truman, in a message to Congress in May 1946, endorsed the plan. He has suggested that the Commission, instead of bringing proceedings against one or two companies engaging in bad business practices, give the whole industry an opportunity to put its house in order by voluntarily adopting trade practice rules."

Among the subjects the industry and the Commission considered for rules were the use in advertising of such terms as "all fabric" and "all purpose" as applied to household dyes; use of the terms "fast," "sunfast" and "fadeless" as applied to colors derived from the dyes; and provisions for preventing deception of the public.

The conference also gave consideration to rules on such subjects as defamation of competitors and unfair disparagement of their products; illegal discriminations in prices and advertising and promotional allowances; and practices which restrain or suppress competition.

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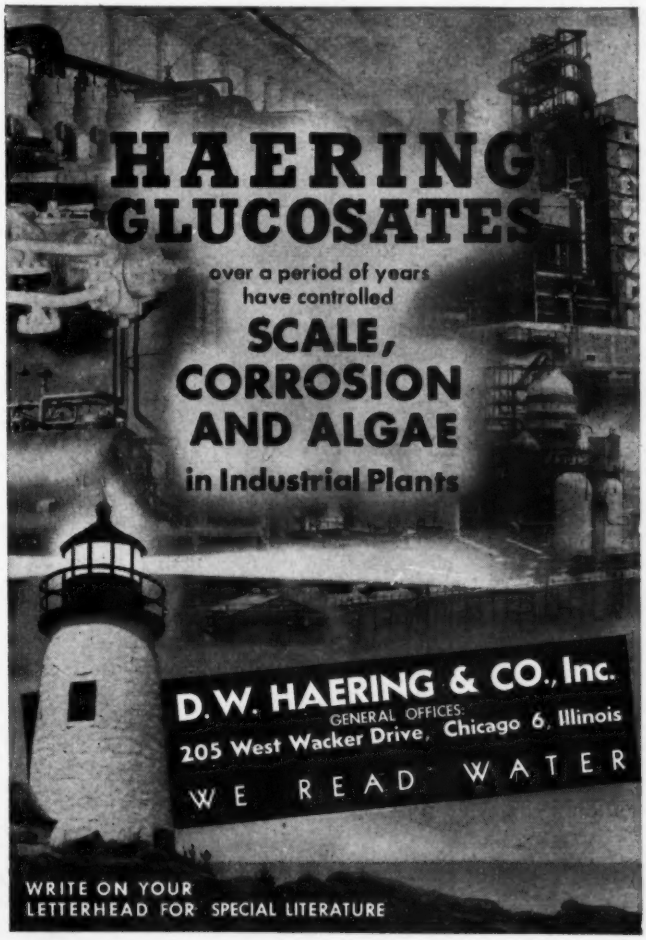

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CANADIAN NEWS

Schedule Increased Synthetic Rubber Output

A record goal of 118 million pounds of synthetic rubber for the year ending Sept. 29, 1947, has been set by Canada's only synthetic rubber producer—the Crown-owned, $48 million Polymer Corporation. This represents an increase of 11 million pounds or 10.3 per cent over its 107 million pound output of the past twelve months.

It was only three years ago that Polymer produced its first commercial batch of synthetic rubber. In the first year of operation output approximated 60 million pounds, and was boosted to 102, and 107 million pounds in ensuing years.

Of the total of 269 million pounds produced, 222 million pounds has been Buna-S and 47 million pounds butyl. In addition the plant turned out 32 million pounds of cumene, 8.5 million pounds of ethyl benzene, and 2.3 million pounds of toluene, during the war years. Too, it has yielded 5 million pounds of styrene in excess of its own requirements. During the coming year styrene capacity will be stepped up to supply 12 million pounds to Dow and Monsanto for the production of polystyrene.

One noteworthy feature is that although most of Polymer's synthetic rubber output is consumed in Canada active negotiations have been conducted in export markets. Shipments have been made to several European countries, including France. Yet Polymer is government-owned, and Britain"s natural rubber policy has never been indecisive.

Celanese Begins Construction Of New Unit

Canadian Celanese Co., Ltd., which has just completed initial units of a $5 million expansion for the production of cellulose acetate staple filament and yarn at its Drummondville, Que., plant, has recently begun construction of a $1 million project at Sorel, Que. Officials state that the new facilities will permit "extension" of present products, but that detailed plans have not as yet been finalized.

Nevertheless it has been acknowledged that the manufacture of cellulose acetate molding powders in Canada is an "eventual" probability. At present demand for such molding compounds approximates 9 million pounds annually, and domestic output is less than a third of this total.

Sole Magnesium Producer To Re-open Plant

Dominion Magnesium Co., Ltd., owner of Canada's only magnesium-producing facilities, is planning to resume the operation of its plant (located just north of Ottawa) early in January, according to J. D. Barrington, vice-president. This is the first time since the end of the war that orders on hand have justified manufacturing operations.

The project was built by the government at a cost of $3.4 million to serve essentially as a proving unit for the Pidgeon ferrosilicon reduction process. Initial costs were said to approximate 50 cents per pound of magnesium, which were later pared to 20 cents, with a 14 cent figure declared attainable.

The complete facilities were sold in mid-1945 to the present owners for $1.4 million, on a basis of $100,000 cash with the balance payable at the rate of 1 cent per pound of magnesium sold. Since that time additional conveying and calcining equipment has been installed and laboratory facilities have been expanded.

According to company officials a fair export business has been effected through negotiations with consumers in Sweden, Belgium, Czechoslovakia, Great Britain, and Mexico.

C. I. L. Sales Up And Income Gains

Total sales of Canadian Industries, Ltd. (I. C. I.-Du Pont), for the first nine months of this year are reported to be 10 per cent higher than during the comparable 1945 period, and some gain in net income has likewise been realized. It is pointed out, however, that the full effect of increased manufacturing costs has not as yet been felt. Net 1945 income was $4,929,124.

Company plans include the construction of a new sulfuric acid unit at Hamilton, Ont.; equipment changes to boost cellophane output; completion of additions to its Kingston nylon plant; and construction of a unit at Brownsburg, Que., for the manufacture of nylon paint brush bristles.

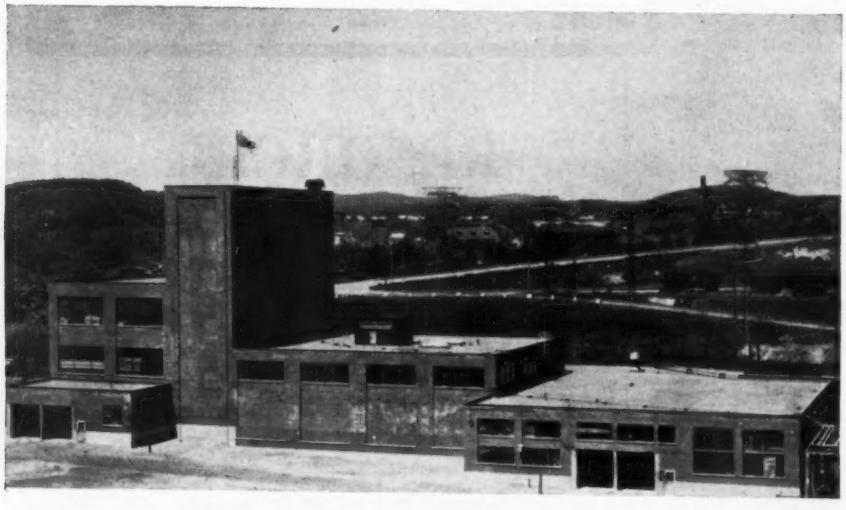
Now nearing operation, the addition to C. I. L.'s nylon filament plant is scheduled to increase capacity to 2,250,000 pounds per annum. When established in 1942 rated capacity stood at 400,000 pounds and was later extended to 1,500,000 pounds.

Chemicals Ltd. Broadens Marketing Activities

Chemicals, Ltd., Montreal, long-established importer and jobber of industrial chemicals and raw materials, has completed plans for the opening of a Toronto office and warehouse early in January. Hitherto the company—one of the Dominion's major distributors of zinc oxide—has confined its activities mainly to the province of Quebec.

For many years a heavy interest in this concern was held by financier John Irwin, but it has been reported that this interest was acquired by Dominion Rubber Co., Ltd. (U. S. Rubber Co.), coincidental with its purchase of the Irwin Dyestuff Co. in 1945. Dominion Rubber Co. also owns Naugatuck Chemicals.

New Canadian Vinyl Plastics Plant



A major recent addition to Canada's plastics industry is the Canadian Resins and Chemical Co. Ltd. polyvinylchloride-acetate copolymer unit at Shawinigan Falls, Que. Prior to the construction of this project Canada exported the basic resin and imported the plasticized material from the U. S. A. Completed only a few months ago plans for expansion of these facilities are reported to be already under consideration. Located adjacent to the calcium carbide and chemical derivatives plants of Shawinigan Chemicals Ltd., the company is jointly owned by Shawinigan and Union Carbide and Carbon Corporation.

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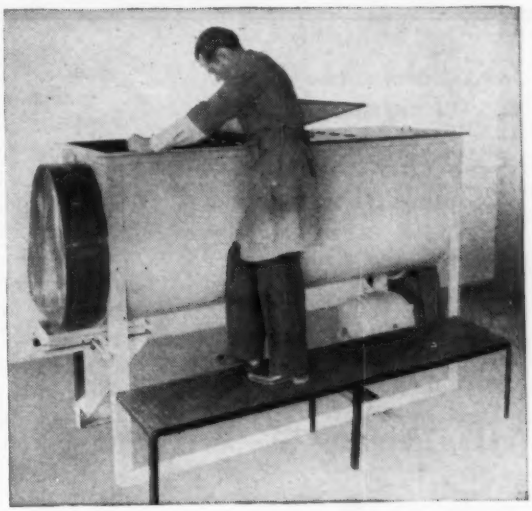

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MARKET OUTLOOK

More Casein and Lower Prices Forecast

Drying Oils Expected To Remain Short

Higher Lead Quotations To Boost Output

CPA Revamps Fertilizer Export Program

Market Review

●

Casein Supply and Price Situation To Improve

Although there is little possibility that casein supplies will move into a much easier position within the next few months, there is a definite prospect of both a lower price and a better delivery position by Spring. Major influence on the market will be the greater quantities of Argentine casein available as a result of the higher price now being paid producers by the Argentine government, without a corresponding boost in the government's selling price. Too, normally U. S. casein output gains during the summer months—when cattle are being pastured.

Some additional shipments from Argentine have been scheduled already, but it is not anticipated that heavy tonnages will arrive at U. S. ports much before February or March. Upon receipt of increased quantities of casein, a moderate decline in prices is anticipated, and a further reduction may be effected later in the year as U. S. output climbs.

Major reason for the Argentine government's action has been the realization that marked resistance to high casein prices has crystallized, and a continued pursuit of the policy can "kill" the market. The law of supply and demand still functions, and as was suggested in this column several months ago, casein producers are not unmindful of the inroads which have been made by soy protein and synthetic plastics.

Drying Oils Destined To Remain Tight

No substantial relief from shortages of uerilla, dehydrated castor, fish, and oiticica oils can be expected in the near future in the opinion of suppliers who reported recently to the National Paint, Varnish and Lacquer Association. Even the return to a free market—although it may improve the situation—is not viewed as promising to abate consumers' worries.

Castor oil, which has been short for months past, will continue in its tight position, unless the extremely high price for beans opens up new supply sources in the interior of Brazil. Most of the current crop of beans has been purchased by countries other than the U. S. during August and September, when OPA ceilings prohibited U. S. crushers from bidding. And demand is such that the odds are against any paring of the price of either beans or oil for some time to come. During the first nine months of this year castor bean imports totalled only 70,000 tons; from 1941 to 1945 imports averaged 140,000 tons.

As for oiticica the recently harvested Brazilian crop appears to have been completely sold out, and not before next February or March will new crop oil reach the U. S. High prices being offered may, however, result in the shipment of some previously extracted oil which has been held in the hands of speculators. More attention is being paid to this crop by Brazilian companies and it is anticipated that heavier tonnages will be received over the longer term, as new territories are tapped.

The prospects for immediate resumption of perilla shipments are not encouraging. Most of the dominant Japanese businessmen who controlled the market have been put out of business and their properties confiscated by the Chinese Government for subsequent disposal. Nevertheless, both seed and oil are being produced, and it is anticipated that about 37,000 tons of this oil will be received during 1947.

In addition menhaden oil production on the East Coast has held up well, but sardine oil production on the Pacific Coast has been running only about 17 per cent of the 1945 yield.

Higher Lead Prices Presage Greater Output

An eventual easing of lead supplies may well result from the action of American lead refiners and producers whereby the price was boosted to 11.8 cents per pound. Previously quotations had hovered around the 10.5 cent level.

Throughout the war prices were main-

Market Review

Heavy Chemicals—Price increases featured the entire month's trading as ceilings were removed. Some advances were sharp, but on the whole quotations tended to level off at about 15 per cent above the figures which have been prevailing for some years. The jumped from 18 to 55-58 cents a pound. This quotation, still below the cost of greatest advance was in glycerin which imported material, is close to the black market price which has obtained for the past six months. Also on the up were caustic potash and potassium carbonate, which moved 4 to 11 per cent, and lead acetate in which the first price increase since 1942 was effected. Sodium silicate, alcohol, and phthalic anhydride quotations also rose, the latter a result of higher crude naphthalene costs.

All salts of copper, lead, and zinc were firmer and difficult to obtain. Sodium fluoride markets displayed a better tone than they have since the advent of DDT. Soda ash and caustic soad continued as premium items, and 1947 contracts on the alkalies were being booked at figures 10 to 20 cents a cwt. above past schedules. Calcium chloride prices also advanced, even though supplies were virtually unobtainable. No easing in the stringent acetic acid situation was in evidence.

However, even though prices ascended in all lines, basic producers were not unaware of trade reaction. In several quarters the placing of orders was being deferred in view of a feeling that some levelling of quotations would be effected early next year—particularly when speculators' stocks had been pared.

Raw Materials—Carnauba quotations softened slightly, and reports were current in the market that one of the major U. S. consumers has recently unloaded a heavy inventory. New developments in the manufacture of floor waxes have given rise to the feeling that much less carnauba will be required by this concern within the next year. Candelilla quotations held up, but gum arabic and agar agar softened. A sale of agar agar at $3.20, versus the current $4.25 was rumored. Cod liver oil consumers appeared to be well covered for the winter, and the market was a little less active than has been the case.

Agricultural Chemicals—Most insecticides remained in the "difficult to obtain" category, and inventories were so low that no cushion was provided to ease the blow of further shortages which will arise from the coal strike. Ammonium sulphate output dipped as a result of the strike. Superphosphate deliveries ran behind schedule, and potash fertilizers suppliers were well booked up to March.

tained at 6.5 cents per pound, mainly by means of government subsidy arrangements. Later it advanced to 8.25 cents, and more recently to 9.5 cents.

Not long ago the government ended its war-born job as the country's sole importer. On this basis the Metals Reserve Co. had been absorbing the U. S. import duty and a portion of the transportation costs. According to industry spokesmen the higher price now in force will stimulate mine production of lead in the U. S. and, simultaneously should augment the supplies of scrap metal available.

Nevertheless, U. S. mine production of the currently scarce metal will aggregate only about 350,000 tons this year. This compares with an output of 461,000 tons in 1941 and 496,000 tons in 1942. In recent months there has been very little scrap lead on the market—such sources usually account for 300,000 tons of metal a year—as dealers withheld stocks in anticipation of higher prices.

Although this price action is definitely contributory to an easing in lead supplies, it is not expected that a material easing in the supply position will be evident until well on in 1947.

CPA Places New Demands For Fertilizers

The Civilian Production Administration reports that priority assistance will be offered various foreign countries to enable them to obtain from U. S. producers the quantities of nitrogen for agricultural purposes allocated to them last June.

This announcement was made following a recent meeting of the Nitrogen Producers Advisory Committee, called by CPA to discuss ways of increasing exports of nitrogenous fertilizers. So far commitments made by U. S. nitrogen producers to foreign countries have fallen short of the quotas established for the fertilizer year.

Of an estimated supply of 815,000 tons of ammonium sulphate, approximately 202,000 tons will be required for distribution to foreign countries. Out of a yearly supply of 604,825 tons of ammonium nitrate some 190,000 tons will be required to meet foreign allocations. Under CPA direction private producers of ammonium nitrate who have supplied 110,000 tons of the chemical to the War Department for use in occupied areas were to have a like amount of material returned to them when ordnance plants resumed operations. Under the revised plan the rebate will be made by transfer of the nitrate to the countries to which U. S. nitrate has been allocated. The producers to whom the government owes the nitrogen will be credited accordingly.

In addition, U. S. producers will be required to ship 33,000 tons in December, plus 8000 tons in the first quarter of 1947, and 20,000 tons during the second quarter to make up the deficit.

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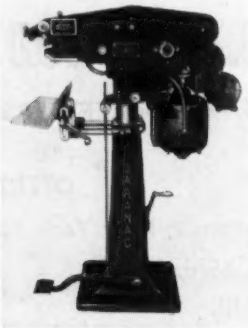

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Labor Shortage Holds Lead Output Down

The average daily rate of lead output from domestic mines remained unchanged in September, according to the Bureau of Mines, United States Department of the Interior. Due to a shorter working period in September, total mine production declined 924 short tons, although the average daily output remained at 904 tons. The September production failed to equal the average monthly output during the first half of 1946 by 1,098 tons (4 per cent) and was 17 per cent under the average monthly production during 1945. The shortage of mine and mill labor continued to be a potent factor limiting domestic mine output. The predicted return to the mines of former employees who migrated to the cities for high-paying wartime jobs had fallen far short of expectations. Likewise, a large percentage of the labor supply which entered the armed services during the war have failed to return upon demobilization.

In the Western States except for California, Idaho, and Washington, all States recorded declines in the rate of lead output. The average daily rate of output in the Central States gained slightly in September; production was maintained at at a level approximately 9 per cent below the monthly average during the first half of 1946. Lead production in the Eastern States dropped 17 per cent under the August output.

Barite Production High: Stocks Up—Shipments Off

Production of barite in the second quarter of 1946, advancing seasonally, was higher than during any previous second quarter and has been surpassed only by the record output in the third quarter of 1945, according to the Bureau of Mines, United States Department of the Interior.

As in the first quarter, total production in the second quarter again exceeded total shipments, owing to great activity in Arkansas and Missouri, and stocks of crude barite were built up in Missouri to unusually high levels. On the east coast, however, the shortage of barite was accentuated by lower production in Georgia and Tennessee in the first half of 1946 compared with the comparable period of 1945. The steady decline in shipments of barite to well drillers in the Gulf area is being offset in some degree by increased shipments to lithopone makers, and as the construction program unfolds, the amount of barite required for lithopone may be expected to increase further. Shipments to chemical manufacturers continued the down-trend begun after VJ day.

Bauxite Mining Declines Sharply

The sharp decline in domestic mine production of bauxite in 1945 was caused by a decreased demand in the alumina and other industries, use of ore from stockpiles, and a larger excess of imports over exports, according to the Bureau of Mines, United States Department of the Interior. Output of crude bauxite in 1945 totaled an estimated 1,146,785 long tons (981,372 tons, dried equivalent), a decline of over 65 percent from the 3,322,442 tons (2,823,724 tons, dried equivalent) produced in 1944. Value of the 1945 output was estimated at $5,631,335 compared with $14,402,497 in 1944. Shipments of crude bauxite from mines to processing plants, consuming plants, and Government stockpiles in 1945 totaled 1,349,358 tons (1,155,828 tons, dried basis), a decline of 59 percent from 1944.

Fertilizer Tag Sales Continue Rise

The upward trend in fertilizer tag sales continued in September with such sales in that month totaling 559,000 equivalent tons, or 49 per cent greater than sales in September 1945 and 63 per cent above September 1944, according to the compilation of The National Fertilizer Association. Sales in each month of this year, with the exception of April, have been larger than the corresponding month of last year. The 11 Southern States accounted for 401,000 tons, or 39 per cent more than a year ago, while the 5 Midwestern States totaled 158,000 tons, or 84 per cent more than the preceding year. With the exception of Georgia and Louisiana, September sales were higher in each of the States cmmpared with a year ago.

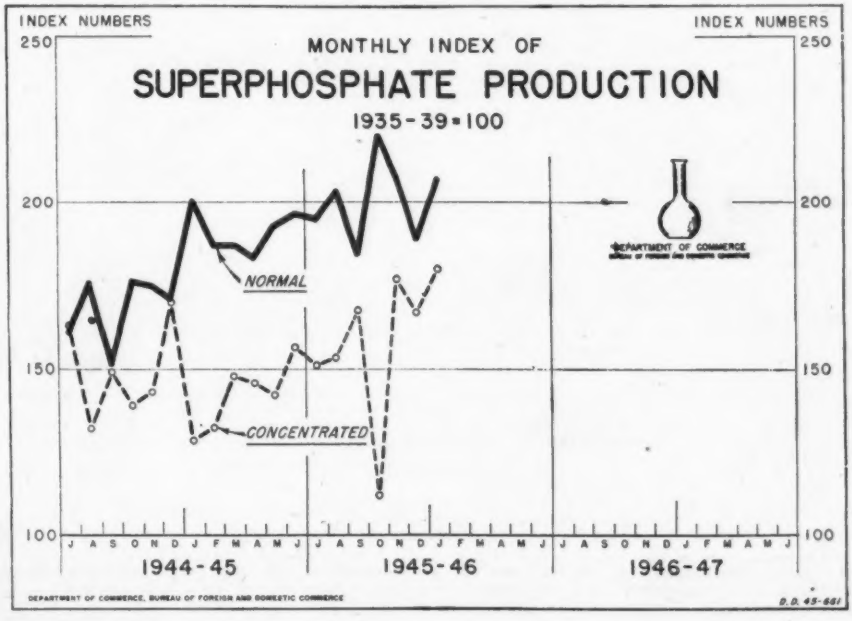
For the first 9 months of 1946, tag sales aggregated 7,234,000 equivalent tons and were 14 per cent greater than the corresponding period of 1945, and 25 per cent greater than 1944. The rise over last year in the Southern States was widespread with gains ranging from a 2 per cent rise in Georgia to a 153 per cent rise in Oklahoma; a slight decline took place in Louisiana. The Southern States averaged a net gain of 11 per cent over the January-September 1945 sales. The relatively greater increase in the Midwest than in the older fertilizer using regions in the East and South, which has been pronounced in recent years, has continued this year. The increase in the 9 months was 31 per cent over a year ago in the Midwestern States, with substantial increases in each of the 5 States.

Zinc Registers Sharp Gain

Production of zinc in August increased 37 per cent of the 13-year record low in July, thus terminating the steep downward trend of mine output in evidence since February, according to the Bureau of Mines, United States Department of the Interior.

The increased August output, however, failed to equal the average monthly production during the first half of 1946 by 2,216 tons (5 per cent) and was 10 per cent under the average monthly output during 1945.

The pronounced increase in zinc production in August can be attributed largely to clarification of the unstable price



situation which existed during July through restoration of the Premium Price Plan on July 26.

Potash Soap Production—Pastes Up; Liquids Down

There was a small increase in the production of potash soaps during 1945 over 1944, according to figures compiled by the Potash Soap Division of the Association of American Soap and Glycerine Producers. Reports from 69 companies showed a total of 106,770,717 pounds (gallons converted into pounds) in 1945, compared with 101,660,166 pounds reported by the same companies in 1944.

There was a large increase (34.9 per cent) in the pounds of paste, soft, jelly, base, and hard potash soaps made, with corresponding decreases in the pounds of other potash soaps made. The pounds of dry cleaning soaps made in 1945 declined 65.4 per cent compared with 1944; and the pounds of liquid soaps made declined 8.2 per cent.

In 1945, these 69 manufacturers used 31,242,008 pounds of oils and fatty acids and 6,733,202 pounds of caustic potash compared with 35,747,836 pounds of oils and fatty acids and 6,173,287 pounds of caustic potash the year before.

Farm Fertilizer Purchases Near Half Billion

Farmers in the United States spent $440 million for fertilizer in 1945 compared with $400 million in 1944 and $215 million in 1939, according to the U. S. Department of Agriculture. In 1945 farmers spent $2,009 million for feed, $1,071 million for livestock, $870 million for gasoline and other operating costs for motor vehicles, and $2,210 million for hired labor. These expenses were paid out of a gross income from agriculture totaling $24,065 million.

When these and other expenses were all paid, the average realized *net* income of farm operators, per farm, amounted to $2,354 in the United States, with the highest average in California at $6,051, and the lowest in West Virginia at $896.

Lead-Zinc Reports Available

In its wartime mineral development program, the Bureau of Mines was responsible for considerable exploratory work that resulted in commercial development of many deposits of critical and strategic metals and minerals, among which were lead and zinc operations in Nevada and Idaho.

In Eureka County, Nevada, and Bonner County, Idaho, the development projects were instituted under the Strategic and Critical Materials Act of 1938 and subsequent legislation. Preliminary examinations, exploratory work, and preparation of the final reports were under the direction of the Bureau's Mining Branch

PRODUCTION OF SYNTHETIC ORGANIC CHEMICALS

Chemical[1]	Unit of quantity	May 1946	June 1946	July 1946	August 1946
Acetanilid, tech. and U.S.P.	Lb.	474,208	624,448	....	493,197
Acetic acid:					
Synthetic	Lb.	20,714,972	23,537,441	23,907,485	24,383,068
Recovered	Lb.	95,293,469	93,380,010	99,522,121	94,679,656
Natural[2]	Lb.	2,550,689	2,475,544	2,423,495	2,676,437
Acetic anhydride[3]	Lb.	40,756,608	42,545,646	44,520,734	39,954,493
Acetone	Lb.	26,046,575	27,756,869	24,666,012	30,016,254
Acetylsalicylic acid	Lb.	975,168	676,315	572,337	459,677
Aniline	Lb.	6,721,261	6,988,687	8,213,302	8,326,193
Barbituric acid derivatives:[4]					
5-Ethyl-5-phenylbarbituric acid and salts (Phenobarbital)	Lb.	41,313	29,115	38,331	27,310
5-Ethyl-5-(1-methylbutyl)-barbituric acid and salts (Pentobarbital)	Lb.	8,201	....	....	3,012
Benzene: (Benzol)					
Motor grade:					
Tar distillers[5]	Lb.	782,756	707,589	502,589*	526,022
Coke-oven operators[6]	Lb.	1,831,124	2,527,819	3,082,148*	3,220,789
All other grades:					
Tar distillers[5]	Gal.	2,451,310	2,064,339	1,381,563*	1,142,284
Coke-oven operators[6]	Gal.	5,019,921	8,269,294	9,714,294*	10,617,860
Butyl alcohol, primary, normal	Lb.	8,586,333	7,340,500	8,303,378	10,250,404
Carbon disulfide	Lb.	22,941,851	26,032,302	23,360,877	24,117,958
Carbon tetrachloride	Lb.	8,816,061	11,231,323	10,674,553	13,474,610
Chlorobenzene, mono	Lb.	24,713,262	22,497,058	20,887,731	22,157,017
Creosote oil:					
Tar distillers[5]	Gal.	8,527,236	8,178,030	8,623,813*	9,120,724
Coke-oven operators[6]	Gal.	964,830	1,923,136	2,529,843*	2,991,576
Cresols:[7]					
Meta-para	Lb.	204,589	134,701	536,301	977,008
Ortho-meta-para	Lb.	....	587,258	1,063,308	739,052
Cresylic acid, refined[7 8]	Lb.	1,361,784	1,902,690	2,180,642	2,339,110
Dibutyl phthalate	Lb.	1,091,150	888,460	1,118,944	1,329,821
Dichlorodiphenyltrichloroethane (DDT)	Lb.	4,079,507	3,542,015	3,573,122	4,020,189
Dyes (commercial concentrations):					
C.I. 202 Chrome blue black R	Lb.	197,525	134,572	85,196	132,323
C.I. 581 Direct black EW	Lb.	934,968	770,968	739,370	608,316
C.I. 1114 Anthraquinone vat blue BCS 20%	Lb.	226,767	180,699	226,502	167,587
F.P. 302 Naphthol AS	Lb.	115,140	54,373	103,289	....
Ethyl acetate (85 percent)	Lb.	7,179,862	6,542,137	9,877,090	8,121,625
Ethyl ethers, tech. and U.S.P.	Lb.	3,909,827	3,236,276	3,448,050	3,585,867
Formaldehyde (37 per cent by weight)	Lb.	34,162,455	30,602,848	38,094,994	38,149,391
Lakes: Peacock blue	Lb.	273,428	242,020	264,412	243,067
Methanol:					
Natural[9]	Lb.	1,378,637	1,315,384	1,326,054	1,303,844
Synthetic	Lb.	7,431,682	39,030,932	44,841,123	45,305,406
Naphthalene:					
Tar distillers:[5]					
Crude, solidifying at—					
Less than 79 C	Lb.	15,280,487	11,094,356	17,505,571	16,177,971
Refined, solidifying at—					
79 C. and over	Lb.	7,889,395	6,999,214	7,372,423	7,501,829
Coke-oven operators:[6]					
Crude, solidifying at—					
Less than 79 C	Lb.	2,152,410	5,156,055	7,320,652*	7,771,396
Penicillin[4]	Million Oxford units.	2,678,000	2,170,748	2,292,287	2,100,362
Phenol (synthetic and natural) tech. and U.S.P.[7]	Lb.	17,219,914	18,322,061	13,492,879	14,812,191
Phthalic anhydride	Lb.	8,127,695	7,739,056	8,921,278	8,466,990
Styrene (Government owned plants only)	Lb.	33,557,386	34,833,300	32,835,374	32,200,339
Sulfa drugs:[4]					
Acetylsulfathiazole	Lb.	....	....	....	....
Sulfanilamide	Lb.	....	n.a.	n.a.	....
Sulfathiazole	Lb.	144,544	n.a.	n.a.	....
All other	Lb.	315,012	n.a.	n.a.	288,521
Tetramethylthiuram sulfides	Lb.	....	....	....	....
Toluene:					
Coke-oven operators[6]	Gal.	1,280,479	1,113,202	1,392,681*	1,255,713
All other[8 10]	Gal.	959,057	1,426,686	1,050,287	1,482,622
Vitamins:[4]					
Ascorbic acid and salts:					
Quantity	Lb.	....	53,198	60,160	53,499
Value	....	n.a.	n.a.	n.a.	n.a.
Ergosterol, irradiated (Vitamin D_2):					
Quantity	Million U.S.P. units.	4,747,771	2,365,912	1,803,312*	2,914,884
Value	....	n.a.	n.a.	n.a.	n.a.
Niacin and niacinamide:					
Quantity	Lb.	66,512	47,069	....	74,604
Value	....	n.a.	n.a.	n.a.	n.a.
Pyridoxine (B_6):					
Quantity	Lb.	741	566	1,111	757
Value	....	n.a.	n.a.	n.a.	n.a.
Riboflavin for human consumption:					
Quantity	Lb.	....	....	....	....
Value	....	n.a.	n.a.	n.a.	n.a.
Thiamin chloride (B_1):					
Quantity	Lb.	16,237	7,563	13,831	16,860
Value	....	n.a.	n.a.	n.a.	n.a.
All other vitamins:[11]					
Quantity	Lb.	n.a.	n.a.	n.a.	n.a.
Value	....	n.a.	n.a.	n.a.	n.a.

[1] Reported on the basis of 100 percent content of the specified material unless otherwise indicated.
[2] Natural acetic acid (produced by direct process from wood) and acetic acid distilled from calcium acetate as reported to the U. S. Bureau of the Census.
[3] Produced from ketone, acetylene, ethylene, and from acetic acid by the vapor phase process.
[4] Statistics are given in terms of bulk medicinals only.
[5] Produced by tar distillers from purchased coal tar only or from oil-gas or water-gas tar produced or purchased by tar distillers.
[6] Product of byproduct coke-oven operators only. These statistics are collected and compiled by the Coal Economics Division, U. S. Bureau of Mines.
[7] Statistics represent total production, from all sources including both data reported by coke-oven operators to the Coal Economics Division, Bureau of Mines, and that reported by distillers of purchased coal tar to the U. S. Tariff Commission.
[8] Includes refined cresylic acid derived from petroleum.
[9] Imported to the U. S. Bureau of the Census.
[10] Includes toluene produced from petroleum by any process.
[11] Includes panthothenic acid and salts, riboflavin for animal use, irradiated animal sterols, menadiones and other vitamins for which statistics are not shown.

Note—n.a. signifies information is not available. (....) indicated either the statistics are confidential because publication would reveal operations of individual companies, or the data which had been received at the time of publication of this report were not indicative of total production. * Revised.

and analyses of samples and beneficiation tests were made by the Metallurgical Branch.

Publication of the results of the Bureau's mineral development program was not feasible during the war, but the detailed information now is available.

The latest reports released describe work on lead and zinc deposits as follows:

Report of Investigations 3928, "Exploration of the Mount Hope Mine, Eureka County, Nevada," prepared by E. J. Matson. Encouraged by favorable results of the Bureau's diamond drilling at this property, a commercial company subsequently drilled 51 underground holes and later constructed a power plant and mill to treat about 200 tons of ore a day. The first zinc concentrates were shipped early in July last year.

Report of Investigations 3992, "Clark Fork Lead-Zinc District, Bonner County, Idaho," prepared by S. H. Lorain. In production on a small scale since about 1913, the Pearl fault of this district proved to contain ore bodies of exceptional strength and persistence. The Bureau's work indicated the continuity and mineralization of this fault, later confirmed by commercial development.

Copies of the foregoing reports of investigations may be obtained free by writing to the Bureau of Mines, Department of the Interior, Washington 25.

CHEMICALS

UNITED STATES PRODUCTION, September 1946

Statistics on the production of chemicals shown in the following table are a continuation of the series initiated with the report of February 7, 1944, in "Facts for Industry," Series 6-1-1 which covered the years 1941-1943. With the end of the war, the list of chemicals covered was reviewed and those presented here were selected for continuation. While considerably curtailed, this group of chemicals and gases is fairly representative of the products of the inorganic chemicals industry and provides sufficient information for gauging the broad changes in operations from month to month. This list is subject to change if future developments indicate that additional chemicals should be covered or that certain of those on which data are now published have relatively small interest. The figures shown here represent the primary production of the various chemicals in the United States, including quantities produced for further processing in the same plant, for intra-company transfer and for sale. Data on consumption and stocks in producing plants, included in this release through September 1945 are no longer collected.

CHEMICAL AND BASIS	UNIT	PRIMARY PRODUCTION	
		September	August
Ammonia, synthetic anhydrous[1]	Short tons	77,492	75,794
Ammonium nitrate, original solution (100% NH_4NO_3)[2]	Short tons	73,730	77,638
Ammonium sulfate, synthetic (technical)[3]	M pounds	19,658	10,683
Calcium arsenate (100% $Ca_3(AsO_4)_2$)	M pounds	2,622	8,081
Calcium carbide (commercial)	Short tons	53,940	53,399
Calcium phosphate:			
Monobasic (100% $CaH_4(PO_4)_2$)	M pounds	6,693	6,738
Dibasic (100% $CaHPO_4$)	M pounds	3,076	4,432
Carbon dioxide:			
Liquid and gas	M pounds	18,869	24,279
Solid (dry ice)	M pounds	59,905	72,292
Chlorine[4]	Short tons	104,520	102,550*
Chrome green (C.P.)	M pounds	1,121	1,436
Chrome yellow and orange (C.P.)	M pounds	2,937	3,410
Hydrochloric acid (100% HCl)	Short tons	29,789	29,519
Hydrofluoric acid:			
Anhydrous and technical (100% H_2F_2)	M pounds	(5)	4,074*
Hydrogen	Millions of cubic feet	1,621	1,675*
Lead arsenate (acid and basic)	M pounds	1,630	253
Methanol (natural) (100% CH_3OH)	M gallons	184	196
Molybdate chrome orange (C.P.)	M pounds	329	443
Nitric acid (100% HNO_3)	Short tons	54,136	59,144
Oxygen	M cu. ft.	996,546	1,008,061
Phosphoric acid:			
Total (50% H_3PO_4)	Short tons	73,694	74,574*
From phosphorus (50% H_3PO_4)	Short tons	36,975	34,454
From phosphate rock (50% H_3PO_4)	Short tons	36,719	40,120*
Silica gel:			
Desiccant and aviation gas catalyst grades	M pounds	4,001	4,242
Silver nitrate (100% $AgNO_3$)	M ounces	4,352	3,879*
Soda ash (commercial sodium carbonate):			
Ammonia soda process—			
Total wet and dry (98-100% Na_2CO_3)[7]	Short tons	358,628	364,178
Finished light (98-100% Na_2CO_3)[8]	Short tons	168,278	167,983
Finished dense (98-100% Na_2CO_3)	Short tons	135,442	139,678
Natural[9]	Short tons	18,330	19,250
Sodium bicarbonate (refined) (100% $NaHCO_3$)	Short tons	16,558	17,054
Sodium bichromate and chromate	Short tons	6,601	7,254
Sodium hydroxide (caustic soda):[10]			
Electrolytic process—			
Liquid (100% NaOH)	Short tons	102,209	99,870*
Solid (100% NaOH)	Short tons	17,025	18,145
Lime-soda process—			
Liquid (100% NaOH)	Short tons	62,422	63,745
Solid (100% NaOH)	Short tons	19,606	20,504
Sodium phosphate:			
Monobasic (100% NaH_2PO_4)	Short tons	1,057	1,218
Dibasic (100% Na_2HPO_4)	Short tons	4,840	5,103
Tribasic (100% Na_3PO_4)	Short tons	7,599	7,958
Meta (100% $NaPO_3$)	Short tons	2,353	2,373
Tetra (100% $Na_4P_2O_7$)	Short tons	4,398	4,778
Sodium silicate:			
Soluble silicate glass, liquid and solid (anhydrous)	Short tons	34,650	36,915
Sodium sulfate:			
Anhydrous (refined) (100% Na_2SO_4)[11]	Short tons	8,008	10,285
Glauber's salt (100% $Na_2SO_4.10H_2O$)[9]	Short tons	13,455	13,209
Salt cake (crude) (commercial)[9 11]	Short tons	43,967	43,779
Sulfuric acid:			
Total (100% H_2SO_4)[12]	Short tons	764,592	762,672*
Chamber process (100% H_2SO_4)	Short tons	249,948[13]	244,874[13]
Contact process (gross) (100% H_2SO_4)[14]	Short tons	514,644[13]	517,800[13]*
Contact process (new) (100% H_2SO_4)[14]	Short tons	469,447[13]	467,759[13]*
Fortified spent acid	Short tons	45,197	50,042
Zinc yellow (zinc chromate) (C.P.)	Short tons	235	216

* Revised.

[1] Data for a small amount of aqua ammonia are included in the figures reported by one company.

[2] Includes that material to be further processed to grained ammonium nitrate.

[3] Excludes by-product coke oven production of ammonium sulfate which is published monthly by the Bureau of Mines in the Monthly Coke Report.

[4] Represents total production of gas, including quantities liquefied for use, storage or shipment.

[5] Not available.

[6] See footnote 6, Series M19A-86.

[7] Includes quantities diverted to manufacture of caustic soda and sodium bicarbonate and quantities processed to finished light and finished dense soda ash. For detailed discussion of soda ash statistics, see "Facts for Industry," Series 6-1-1.

[8] Excludes quantities converted to finished dense soda ash.

[9] Collected in cooperation with Bureau of Mines.

[10] Liquid production figures represent total production for each process including quantities later evaporated to solid caustic and reported as such.

[11] Revised October 1945—April 1946. See footnotes 9, 10 and 11 in "Facts for Industry," Series M19A-66 for June 1946.

[12] Includes sulfuric acid of oleum grade. Beginning January 1946, includes estimates of by-product operation of eight smelters formerly reporting to the Bureau of Mines. See footnotes 13 and 15.

[13] Proportion of estimate, 7 percent.

[14] Includes sulfuric acid of oleum grade.

[15] Proportion of estimate from 2.0 to 2.5 percent.

(*Source: Bureau of Census*)

Major Increase in Superphosphate Output

Superphosphate production totaled 5,783,000 equivalent tons, basis 18 per cent A.P.A., in the fiscal year ending June 1946, and was 12 per cent greater than in the preceding fiscal year, in the 120 plants which report statistics on their operations to The National Fertilizer Association. During the same period, total superphosphate disposed of was 14 per cent greater.

Superphosphate production in June 1946 totaled 302,000 tons, basis 18 per cent A.P.A., which was 13 per cent below June 1945, due principally to the shortage in sulphuric acid supplies. Shipments declined sharply in June compared with the same month a year ago while there was a small increase in superphosphate used in mixed goods. In the first 6 months of 1946, however, production was running a little ahead of the same period a year ago, and shipments and use in mixed goods were also higher than a year ago.

Pulp & Paper Production Continue at High Level

Operations in the paper and paperboard industry continued at a very high level in September, as the daily average rate of production rose even higher than that reached in August. However, the tonnage of paper and board produced declined somewhat because of the fewer working days in September. Preliminary data, released recently in the regular monthly report of the Bureau of the Census, showed total production of paper, paperboard and building board of 1,598,232 tons. This figure is about 86,000 tons below the August record, but nearly 189,000 tons above the corresponding figure for September 1945.

September receipts of pulpwood at 1,819,728 cords, while below the August record, were sufficiently high to increase inventories at pulp mills to 3,953,004 cords, a new high for the year. Consumption in September was 1,504,930 cords.

Receipts of fibrous materials other than

pulpwood were lower in September than in August, and a continuing high rate of consumption reduced inventories of these materials by approximately 5,000 tons.

Chemicals Wartime End-Use Distribution

The Bureau of Census, aided by the CPA, is compiling summaries of end-use data on chemicals collected and compiled by the WPB during the war, which will serve to supplement similar information released by the Chemicals Bureau in wartime. Basically, the series will be concerned with civilian end-uses.

The data are subject to several major limitations. First, the end-use patterns are indicative of wartime distribution, which usually differs markedly from peacetime distribution. Too, most of the releases are based on allocations, which vary indeterminately from actual consumption. The initial allocations summarized authorizations for the distribution of the material, and applicants were not obliged to take full allotments. Furthermore, production was sometimes interrupted, transportation difficulties interfered with deliveries, and purchasers' use schedules were disarranged.

A third important limitation is that the ultimate end-use of chemicals allocated directly for military use is indeterminable, and the indicated end-use pattern is correspondingly distorted in cases where such allocations are large. Indirect military use, however, is included, since it was usually identifiable as such through subcontractors.

Nevertheless, although not of prime importance from the standpoint of statistical validity, and bearing in mind the limitations which affect interpretation, the Bureau submits the data as a reasonable accurate indication of wartime distribution.

PHTHALATE PLASTICIZERS, (EXCEPT DIETHYL, DIMETHYL AND DIBUTYL PHTHALATE): 1944
(Thousands of pounds)

	Amount	*Per cent*
Allocations, Total	*20,029*	*100.0*
Direct military[1]	0	0.0
Export	224	1.1
Other uses	*19,805*	*98.9*
Cable-lacquer and penetrants	11,165	55.7
Textile coatings	4,231	21.1
Cellophane	1,645	8.2
Emulsions	770	3.9
Synthetic rubber	637	3.2
Plastics	574	2.9
Lacquer	353	1.8
Adhesives	268	1.3
Film	146	0.7
Miscellaneous uses and small orders[2]	16	0.1

[1] End-use data not available. Direct military allocations amounted to 2,000 pounds in 1943.
[2] Includes material offered for ersale.

TRISODIUM PHOSPHATE (ANHYDROUS 1944
(Thousands of pounds 100% Na_3PO_4)

	Amount	Percent
TOTAL ALLOCATIONS	*161,172*	*100.0*
Direct military[1]	7,794	4.8
Export	1,663	1.0
Other uses	*151,715*	*94.2*
Military equipment and supplies	11,945	7.4
Boiler water treatment	8,073	5.0
Food and drugs	7,997	5.0
Miscellaneous uses and small orders	123,700	76.8

[1] End-use data not available.

CALCIUM CARBIDE
January 1, 1944—June 30, 1945
(Short tons of 100% CaC_2)

	Amount	Percent
TOTAL ALLOCATIONS	*1,244,662*	*100.0*
Direct military[1]	103,537	8.3
Foreign	19,634	1.6
Other uses	*1,121,491*	*90.1*
Chemical uses[2]	393,373	31.6
Welding, cutting and lighting	333,556	26.8
Miscellaneous uses and small orders[3]	394,562	31.7

[1] End-use data not available.
[2] Includes calcium carbide used for making acetic anhydride, acetaldehyde, vinyl acetate, polyvinyl chloride, trichloroethylene, tetrachloroethane, hexachloroethane, and perchloroethylene.
[3] Includes large amounts used for the preparation of neoprene.

SULFURIC ACID
January 1—June 30, 1945
(Short tons of 100 percent acid)

	Amount	Percent
TOTAL ALLOCATIONS	*7,134,285*	*100.0*
Export	5,210	0.1
Direct military[1]	1,004,671	14.1
Other uses	*6,124,404*	*85.8*
Chemical manufacture	1,741,624	24.4
Ammonium sulfate	284,597	4.0
Aluminum sulfate	171,635	2.4
Hydrochloric acid	106,833	1.5
Hydrofluoric acid	90,190	1.3
Sodium phosphate	49,309	0.7
Primary chromium chemicals	29,171	0.4
Phenol	24,886	0.3
Other chemicals[2]	985,003	13.8
Superphosphate	1,268,562	17.8
Petroleum refining	1,135,330	15.9
Metallurgy	494,642	7.0
Iron and steel	411,204	5.8
Other metallurgical	83,438	1.2
Lead, zinc and titanium pigments	409,792	5.8
Rayon	251,604	3.5
Rubber	52,642	0.7
Industrial explosives	42,112	0.6
Silica gel	33,799	0.5
Miscellaneous uses and small orders[3]	694,399	9.7

[1] End-use data not available.
[2] Includes ethylene dibromide.
[3] Includes cellulose film and sponge.

AMYL ALCOHOLS (ALL GRADES)
April 1—June 30, 1945
(Thousands of pounds mixed alcohols)

	Amount	Percent
TOTAL ALLOCATIONS	*4,623*	*100.0*
Amyl acetate (all grades)	2,345[1]	50.7
Lacquers and solvents[2]	1,279	27.7
Ore flotation reagents	418	9.0
Drugs and pharmaceuticals	235	5.1
Adhesives	180	3.9
Petroleum refining	44	1.0
Miscellaneous uses and small orders[3]	122	2.6

[1] Used in the production of penicillin (20%), lacquers (73%), and other uses.
[2] Includes methyl propyl ketone.
[3] Includes carburizing fluids, gum inhibitors, shoe preparations, electrical equipment uses, cleaners, and printing inks.

TRICRESYL PHOSPHATE
January 1, 1944—June 30, 1945
(Thousands of pounds)

	Amount	Percent
TOTAL ALLOCATIONS	*28,154*	*100.0*
Export	92	0.3
Direct military[1]	583	2.1
Other uses	*27,479*	*97.6*
Cable and impregnation and sheaths	18,054	64.1
Lacquers	2,807	10.0
Textile coatings	2,123	7.5
Cellophane and plastics[2]	1,448	5.2
Adhesives	1,008	3.6
Synthetic rubber	793	2.8
Lubricants	711	2.5
Oil additives	174	0.6
Miscellaneous uses and small orders	363	1.3

[1] End-use data not available.
[2] Includes a small quantity allocated for photographic film.

BENZALDEHYDE:
October 1, 1944—June 30, 1945
(Thousands of pounds)

	Amount	Percent
TOTAL ALLOCATIONS	*2,763*	*100.0*
Export	6	0.2
Special military uses[1]	1,891	68.5
Flavors, foods and cosmetics	288	10.4
Drugs and pharmaceuticals	237	8.6
Dyes and dye intermediates	162	5.9
Photography	81	2.9
Miscellaneous uses and small orders	98	3.5

[1] Includes special military ointment and benzyl benzoate.

ACETIC ANHYDRIDE[1]
January 1, 1944—June 30, 1945
(Thousands of pounds $(CH_3CO)_2O$)

	Amount	Percent
TOTAL CONSUMPTION	*757,321*	*100.0*
Direct military[2]	50,214	6.7
Foreign	214	[3]
Other uses	*706,893*	*93.3*
Yarns and fibres[4]	489,869	64.7
Plastics and resins	182,469	24.1
Drugs and pharmaceuticals	13,935	1.8
Aspirin	9,922	1.3
Other	4,013	0.5
Perfumes and flavor bases	1,112	0.1
Textile processing and dyeing	933	0.1
Miscellaneous uses and small orders[5]	18,575	2.5

[1] Reported consumption, supplemented by allocation data where consumption figures were not available.
[2] End-use data not available.
[3] Less than one-tenth of one percent.
[4] Includes casein fibre.
[5] Includes diacetin and triacetin.

PHTHALIC ALKYD RESINS
April 1—June 30, 1944
(Thousands of pounds, dry basis)

	Amount	Percent
TOTAL ALLOCATIONS	*36,760*	*100.0*
Direct military[1]	2,336	6.3
Foreign	426	1.2
Other uses	*33,998*	*92.5*
Transportation equipment	22,493	61.2
Aircraft	4,735	12.9
Other	17,758	48.3
Arms and ammunition	3,632	9.9
Communication and electrical equipment	2,408	6.5
Industrial machinery, tools and equipment	1,859	5.1
Containers and packaging	1,780	4.8
Building materials and structures	704	1.9
Textiles and leather	353	1.0
Health, scientific, and safety equipment	172	0.5
Furniture	114	0.3
Printing inks, engraving supplies	97	0.3
Photographic equipment and supplies	90	0.2
Miscellaneous uses and small orders	296	0.8

[1] End-use data not available.

ACETIC ACID
January 1, 1944—June 30, 1945
(Thousands of pounds CH_3COOH)

	Amount	Percent
TOTAL CONSUMPTION	*817,065*	*100.0*
Direct military[2]	50,052	6.1
Foreign	911	0.1
Other uses	*766,102*	*93.8*
Plastics and resins	263,593	32.3
Acetic anhydride	212,473	26.0
Organic acetates (esters)[3]	164,357	20.1
Textile processing	37,384	4.6
Metallic acetates (salts)	12,517	1.5
Drugs and pharmaceuticals	11,732	1.4
Paints and pigments	5,639	0.7
Rubber chemicals	3,255	0.4
Photography	2,102	0.3
Miscellaneous uses and small orders[4]	52,920	6.5

[1] Reported consumption, supplemented by allocation data where consumption figures were not available.
[2] End-use data not available.
[3] Predominantly solvents.
[4] Includes nylon salts, chloracetic acid, insecticides, dyestuffs and noval ketone.

SODIUM METAPHOSPHATE
January 1—June 30, 1944
(Thousands of pounds 100% $NaPO_3$)

	Amount	Percent
TOTAL ALLOCATIONS	*20,500*	*100.0*
Direct military[1]	1,096	5.4
Export	255	1.2
Other uses	*19,149*	*93.4*
Boiler-water treatment	11,785	57.5
Military equipment	1,146	5.6
Oil well drilling	903	4.4
Food and drugs	62	0.3
Miscellaneous uses and small orders	5,253	25.6

[1] End-use data not available.

TETRASODIUM PYROPHOSPHATE
January 1, 1944—June 30, 1945
(Thousands of pounds $Na_4P_2O_7$)

	Amount	Percent
TOTAL ALLOCATIONS	*110,014*	*100.0*
Direct military[1]	4,374	4.0
Export	61	[2]
Other uses	*105,579*	*96.0*
Military equipment	9,652	8.8
Oil well drilling	6,563	6.0
Boiler-water treatment	4,342	3.9
Food and drugs	1,294	1.2
Miscellaneous uses and small orders	83,728	76.1

[1] End-use data not available.
[2] Less than one-tenth of one percent.

CHEMICAL KESSCO PRODUCTS SPECIALTIES

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DIBUTYL TARTRATE

BUTYL STEARATE BUTYL OLEATE

BUTYL "CELLOSOLVE"* STEARATE

METHYL "CELLOSOLVE" OLEATE

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AHCO PRODUCTS

METHYL "CELLOSOLVE"* STEARATE

METHYL "CELLOSOLVE" STEARATE, a synthetic ester, is used as a plasticizer for cellulose derivative, paper coatings and wax finishes. The following data may suggest other uses.

Chemical formula, $C_{17}H_{35}COOCH_2CH_2OCH_3$
Molecular weight 342
Color (platinum cobalt scale) 175
Melting point ..... 22° to 24°C
Flash point ..... 378°F
Acidity, less than .6 mg. KOH per gram ester
Specific gravity ..... .888 at 25°/25°C
Iodine value ..... 2 max.
Low volatility

* Trade mark of C&CCC

★

BUTYL STEARATE

BUTYL STEARATE, a synthetic ester, is used as a plasticizer for cellulose and polyvinyl derivatives, also for cosmetics, paper coatings and wax finishes. The following data may suggest other uses.

Chemical formula ..... $C_{17}H_{35}COOC_4H_9$
Molecular weight 341
Color (platinum cobalt scale) 130
Melting point ..... 19° to 20°C
Flash point ..... 358°F
Acidity, less than .6 mg. KOH per gram ester
Saponication number, 171-179 mg. KOH per gram ester
Specific gravity ..... .85-.86 at 20°/20°C
Iodine value ..... 2 max.
Low volatility

ARNOLD-HOFFMAN & CO., INC.
Manufacturing Chemists
PROVIDENCE, R. I.
Established in 1815
Plants at Dighton, Mass. and Charlotte, N. C.
NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE

CURRENT PRICES

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f.o.b. works are specified as such. Import chemicals are so designated.

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—$1.00
November, 1944, $0.880 November, 1945, $0.858
November, 1946, $0.676

	Current		1946		1945	
	Low	High	Low	High	Low	High
Acetaldehyde, 99%, drs. wks. lb.	.11	.14	.11	.14	.11	.14
Acetic Anhydride, drs, ... lb.	.11½	.13	.11½	.13	.11½	.13
Acetone, tks, delv. ..... lb.	.06	.07	.06	.07	.06	.07
ACIDS						
Acetic, 28%, bbls ....100 lbs.	3.38	3.63	3.38	3.63	3.38	3.63
glacial, bbls. .....100 lbs.	9.15	9.40	9.15	9.40	9.15	9.40
tks, wks. .....100 lbs.	6.93	7.25	6.93	7.25	6.93	7.25
Acetylsalicylic, Standard USP ..... lb.	.40	.54	.40	.54	.40	.54
Benzoic, tech. bbls. ..... lb.	.43	.47	.43	.47	.43	.47
USP, bbls, 4,000 lbs. up lb.	...	.54	...	.54	...	.54
Boric tech, bbls. c-l. ..tons *a*	...	109.00	...	109.00	...	109.00
Chlorosulfonic, drs, wks. ..lb.	.03	.04½	.03	.04½	.03	.04½
Citric, USP, crys, gran, bbls. ..... lb. *b*	.20	.21	.20	.21	.20	.21
Cresylic 50%, 210-215° HB, drs. wks. frt. equal gal.	.81	.96	.81	.96	.81	.83
Formic, 85%-90% cbys. .lb.	.10	.11½	.10	.11½	.10	.11½
Hydrofluoric, 30% rubber, dms. ..... lbs.	.08	.09	.08	.09	.08	.09
Lactic, 22%, lgt, bbls wks lb.	.039	.0415	.039	.0415	.039	.0415
44%, light, bbls wks ...lb.	.073	.0755	.073	.0755	.073	.0755
Maleic, Anhydride, drs ...lb.	.25	.26	.25	.26	.25	.26
Muriatic 18° cbys ....100 lb.	1.50	2.45	1.50	2.45	1.50	2.45
20° cbys, c-l, wks. ..100 lb.	...	1.75	...	1.75	...	1.75
22° cbys, c-l, wks. ..100 lb.	...	2.25	...	2.25	...	2.25
Nitric, 36°, cbys, wks 100 lbs. *c*	5.00	5.25	5.00	5.25	5.00	5.25
38°, c-l, cbys, wks 100 lbs. *c*	...	5.50	...	5.50	...	5.50
40°, c-l, cbys, wks 100 lbs. *c*	...	6.00	...	6.00	...	6.00
42° c-l cbys wks 100 lbs *c*	...	6.50	...	6.50	...	6.50
Oxalic, bbls, wks ..... lb.	.12¼	.14½	.11¼	.14½	.11¼	.12½
Phosphoric, 100 lb. cbys, USP ..... lb.	.10½	.13	.10½	.13	.10½	.13
Salicylic tech, bbls ..... lb.	.26	.42	.26	.42	.26	.42
Sulfuric, 60°, tks, wks ton	...	13.00	...	13.00	...	13.00
66°, tks, wks ton	...	16.50	...	16.50	...	16.50
Fuming 20% tks. wks ton	...	19.50	...	19.50	...	19.50
Tartaric, USP, bbls .....lb.	.54½	.55	.54½	.71	.70½	.71
Alcohol, Amyl (from Pentane) tks, delv ..... lb.	...	.131	...	.131	...	.131
Butyl, normal, syn, tks lb.	...	.14½	...	.14½	...	.10¾
Denatured, CD 14, c-l drs ..... gal. *d*	...	.90	...	.90	...	.59
Denatured, SD, No. 1, tks. *d*	...	.82½	...	.82½	...	.52
Ethyl, 190 proof tks...gal.	...	17.94	...	17.94	...	17.60
Isobutyl, ref'd, drs ... lb.	...	.0660	...	.0660	...	.086
Isopropyl ref'd, 91%, dms ..... gal.	.41	.44	.38	.44	.37½	.66½
Alum, ammonia, lump, bbls, wks ..... 100 lb.	...	4.25	...	4.25	...	4.25
Aluminum, 98-99% ...100 lb.	15.00	16.00	15.00	16.00	15.00	16.00
Chloride anhyd l.c.l. wks lb.	.09	.12	.09	.12	.08	.12
Hydrate, light, bgs. ....lb.	...	.14½	...	.14½	.14½	.15
Sulfate, com'l. bgs, wks, c-l ..... 100 lb.	1.15	1.20	1.15	1.25	1.15	1.25
Sulfate, iron-free, bgs, wks ..... 100 lb.	1.75	2.00	1.75	2.00	1.75	2.10
Ammonia anhyd, cyl ....lb.	...	.14½	...	.14½	...	.14½
Ammonia, anhyd. fert. tank cars, wks. frt. equalized ton	...	59.00	...	59.00	...	59.00
Ammonium Carbonate, USP, lumps, dms ....lb.	.08¼	.09½	.08¼	.09½	.08¼	.09¼
Chloride, whi, bbls, wks, 100 lb.	4.45	5.15	4.45	5.15	4.45	5.15
Nitrate, tech. bags, wks. lb.	.0435	.0450	.0435	.0850	.0435	.0850
Oxalate pure, grn. bbls. lb.	...	.23	...	.23	.27	.33
Perchlorate, kgs ..... lb.	no stocks		no stocks		no stocks	
Phosphate, dibasic tech. bgs ..... lb.	.07	.07¼	.07	.07¾	.07	.08½
Stearate, anhyd. dms... lb.	...	34		34		34
Sulfate, dms, bulk ....ton	...	30.00	28.20	30.00	28.20	29.20
Amyl Acetate (from pentane) tks., delv. ..... lb.	...	.181	...	.181	...	.15½
Aniline, Oil, drs ..... lb.	.12	.13	.11½	.13	.11½	.12½
Anthraquinone, sub, bbls... lb.		.70	...	.70	...	.70
Antimony Oxide, bgs ...lb.	.17	.17½	.15	.17½	.15	.16
Arsenic, whi, kgs—powd. lb.	.05	.05¾	.04	.05¾	.04	.04¾

USP $25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deliveries ½c higher than NYC prices; *y* Price given is per gal; *c* Yellow grades 25c per 100 lbs less in each case; *d* Prices given are Eastern schedule, *a* Powdered boric acid $5 a ton higher; *b* Powdered citric acid is ½c higher

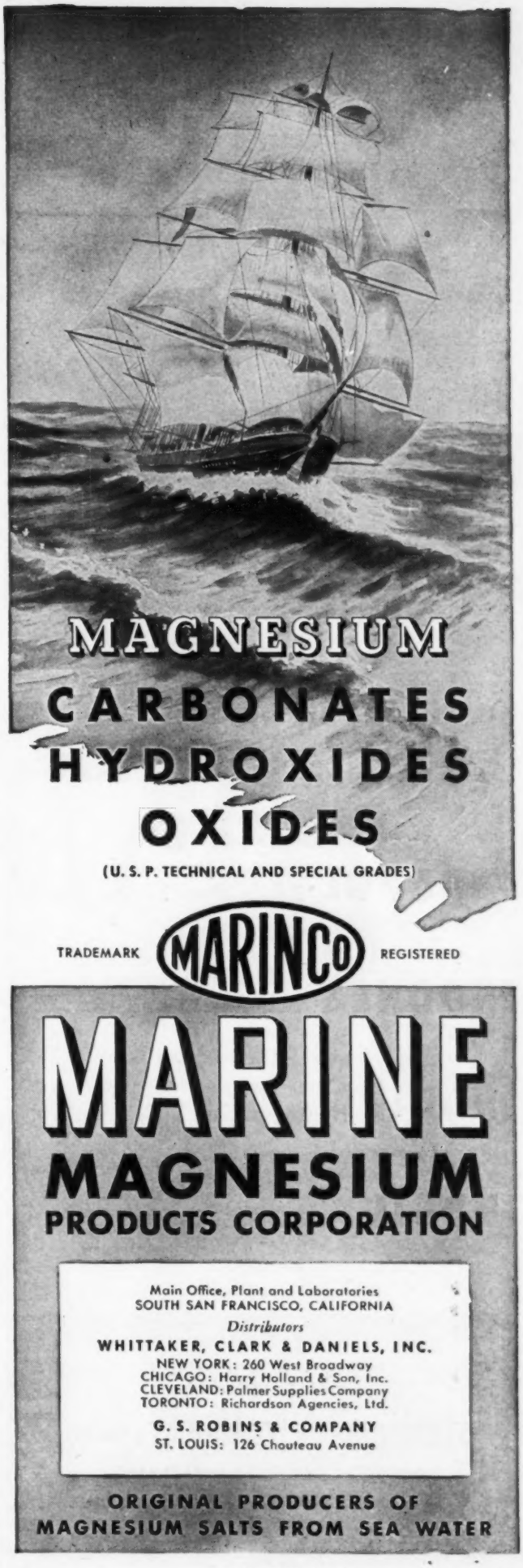
Current Prices

		Current		1946		1945	
		Low	High	Low	High	Low	High
Barium Carbonate precip, wks, bgs.	ton	60.00	75.00	60.00	75.00	60.00	75.00
Chloride, tech, cyst, bgs, zone 1	ton	73.00	78.00	73.00	78.00	73.00	78.00
Barytes, floated, paper bgs.	ton	...	40.95	...	40.95	...	36.00
Bauxite, bulk mines	ton	7.00	10.00	7.00	10.00	7.00	10.00
Benzaldehyde,tech,cbys,dms	lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, tks, ft all'd	gal.	...	.15	...	.15	...	.15
Benzyl Chloride, cbys	lb.	.20	.21	.20	.24	.22	.24
Beta-Naphthol, tech, bbls, wks	lb.	.21	.23	.21	.24	.23	.24
Bismuth metal, ton lots	lb.	1.60	nom.	1.25	1.60	...	1.25
Blanc Fixe, 66⅔% Pulp, bbls, wks	ton	40.00	40.50	40.00	46.50	40.00	46.50
Bleaching Powder, wks,100 lb.		2.50	3.10	2.50	3.60	2.50	3.60
Borax, tech, c-l, bgs	ton	...	45.00	...	45.00	...	45.00
Bordeaux Mixture, drs	lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases	lb.	.21	.23	.21	.23	.21	.30
Butyl, acetate, norm. drs	lb.	.234	.239	.1860	.2390	17.90	19.45
Cadmium Metal	lb.	1.30	1.50	.90	1.50	.90	.95
Calcium, Acetate, bgs, 100 lb.		3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs	ton	50.00	90.00	50.00	90.00	50.00	95.00
Carbonate, c-l bgs	ton	18.00	22.00	18.00	22.00	18.00	22.00
Chloride, flake, bgs c-l	ton	18.50	38.00	18.50	38.00	18.50	35.00
Solid, 73-75% drs, c-l,	ton	18.00	37.50	18.00	37.50	18.00	34.00
Cy'n'd, min. 21% N, c.l.	lb.	.02¼	.02¾	...	...	...	...
Gluconate, U.S.P., drs.	lb.	.57	.59	.57	.59	.57	.59
Phosphate, tri, bbls, cl.	lb.	...	.0635	...	.0635	...	.0635
Camphor, U.S.P., gran, powd, bbls	lb.	.69	.71	.69	.71	.69	.71
Carbon Bisulfide, 55-gal drs	lb.	.05	.05¼	.05	.05¼	.05	.05¼
Dioxide, cyl	lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, Zone 1, 52½ gal. drms	gal.	.73	.80	.69	.80	.73	.80
Casein, Acid Precip, bgs, 10,000 or more	lb.	no prices		.24	.33	...	.24
Chlorine, cyls, lcl, wks, contract	lb.	...	.07¼	...	.07¼	...	.07¼
cyls, c-l, contract	lb.	...	.05¼	...	.05¼	...	.05¼
Liq. tk, wks, contract 100	lb.	...	1.75	...	1.75	...	1.75
Chloroform, tech, drs	lb.	.20	.23	.20	.23	.20	.23
Coal tar, bbls, crude	bbl.	8.25	8.75	8.25	8.75	8.25	8.75
Cobalt, Acetate, bbl	lb.	...	.83¾	...	.83¾	...	.83¾
Oxide, black kgs	lb.	...	1.84	...	1.84	...	1.84
Copper, metal	100 lb.	...	14.75	12.00	14.75	12.00	12.50
Carbonate, 52-54%, bbls.	lb.	.19½	.20½	.19½	.20½	.19½	.20½
Sulfate, bgs, wks cryst.	100 lb.	6.65	7.15	5.00	7.15	5.00	5.50
Copperas, bulk, c-l, wks	ton		14.00		14.00	...	14.00
Cresol, USP, drs	lb.	.11¼	.12¾	.10¾	.12¾	.10¾	.11¾
Dibutylamine, c-l, drs wks.	lb.	...	.66	...	.66	...	.66
Dibutylphthalate, drs	lb.	.2590	.2640	.1700	.2640	.1770	.2359
Diethylaniline, drs.	lb.	...	.40	...	.40	...	.40
Diethyleneglycol, drs, wks	lb.	.14	.15	.14	.15	.14	.15½
Dimethylaniline, dms,cl.,lcl	lb.	.21	.22	.21	.22	.23	.24
Dimethyl phthalate, drs	lb.	.20	.20½	.20	.20½	.20	.20½
Dinitrobenzene, bbls	lb.	...	.18	...	.18	...	.18
Dinitrochlorobenzene, dms.	lb.	...	.14	...	.14	...	.14
Dinitrophenol, bbls	lb.	...	.22	...	.22	...	.22
Dinitrotoluene, dms	lb.	...	.18	...	.18	...	.18
Diphenyl, bbls lcl. wks.	lb.	.16	.20	.16	.20	.16	.20
Diphenylamine bbls	lb.	...	.25	...	.25	...	.25
Diphenylguanidine, drs	lb.	.35	.37	.35	.37	.35	.37
Ethyl Acetate, syn. 85-90% tks, frt all'd	lb.	...	.06½	...	.06½	.0975	.1175
Chloride, drs	lb.	.18	.20	.18	.20	.18	.20
Ethylene Dichloride, lcl. wks, E. Rockies, dms	lb.	.0891	.0941	.0842	.0941	.0842	.0941
Glycol, dms, cl.	lb.	...	.10	...	.10	...	.10
Fluorspar, No. 1, grd.95-98% bulk, cl-mines	ton	...	37.00	...	37.00	...	37.00
Formaldehyde, bbls, cl & lcl	lb.	.0520	.0570	.0520	.0570	.0520	.0570
Furfural tech, dms, c-l,wks	lb.	...	.13	...	.13	...	.13
Fusel Oil, ref'd, dms, dlvd	lb.	.18½	.19½	.18½	.19½	.18½	.19½
Glauber's Salt, Cryst, c-l, bgs, bbls, wks	100 lb.	1.05	1.45	1.05	1.45	1.05	1.45
Glycerine dynamite, dms, c-l.	lb.	...	.55¼	.17½	.55¼	...	.16½
Crude Saponification, 88% to refiners tks	lbs.	.45	.60	...	.60	.09½	.11½

GUMS

Gum Arabic, amber sorts bgs	lb.	.13¾	.14	.11¾	.14¾	.11	.13
Benzoin, artificial, cns.	lb.	1.00	1.70	.52	1.70	.52	1.00
Copal, Congo	lb.	...	no stocks	...	.55¾	...	.55¾
Copal, East India, chips	lb.	...	no stocks	...	.55¾	...	.55¾
Macassar dust	lb.	...	no stocks	...	.07¾	...	.07¾
Copal Manila	lb.	.25	...	.13½	.25	.13½	.15½
Copal Pontianak, bold c-l	lb.	...	no stocks	...	.17¾	...	.23¾
Karaya, bbls, bxs, dms.	lb.	.21	.50	.18	.50	.15	.46

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.



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Current Prices

Gums
Salt Lake

	Current Low	Current High	1946 Low	1946 High	1945 Low	1945 High
Kauri, N. Y.						
Superior Pale XXX....lb.	...	nom.	...	.65¾	...	.65¾
No. 3 .....lb.	...	nom.	...	.22	...	.23
Sandarac, bgs. .....lb.	.90	.95	.90	.99½	...	.99½
Tragacanth, No. 1, cases ..lb.	5.00	5.25	3.75	5.25	3.80	5.00
No. 3 .....lb.	3.20	3.45	2.10	3.45	2.15	3.00
Yacca, bgs .....lb.	...	nom.	.05	.07¼	.06	.07¼
Hydrogen Peroxide, cbys ..lb.	.15½	.18½	.15½	.18½	.15½	.18½
Iodine, Resublimed, jars..lb.	1.75	1.85	1.75	1.85	1.75	2.10
Lead Acetate, cryst, bbls...lb.	...	.12½	...	.12½	...	.12½
Arsenate basic, bg, lcl. lb.	...	.14½	.12	.14½	.11½	.12
Nitrate, bbls. .....lb.		.12½		.12½		.12½
Red, dry, 95% Pb_3O_4 bbls. .....lb.	.14¾	.16	.09	.16	.09	.10¾
97% Pb_3O_4, bbls delv..lb.	.15	.16¾	.09½	.16¾	.09½	.11¼
98% Pb_3O_4, bbls delv..lb.	.15¼	.17	.08¼	.17	.08¼	.08¾
White, bbls .....lb.	.10	.14¼	.07¼	.14¼	.07¼	.08
Basic sulfate, bbls, lcl lb.	.08¾	.09¼	.07¾	.10¼	.07¼	.08
Lime, Chem., wks, bulk..ton	6.50	10.25	6.50	10.25	6.25	13.00
Hydrated, f.o.b. wks ..ton	8.50	12.00	8.50	12.00	8.50	16.00
Litharge, coml, delv. bbls..lb.	.09¾	.11½	.08	.15¼	.08	.09¾
Lithopone, ordi., bgs .....lb.	.0440	.0465	.04¼	.04¾	.04¼	.04¾
Magnesium Carb, tech, wks lb.	.07¼	.10¾	.07¼	.10¾	.06¼	.10¾
Chloride flake, bbls, wks c-l .....ton	...	32.00	...	32.00	...	32.00
Manganese, Chloride, Anhyd. bbls. .....lb.	.14	.16	.14	.18	.15	.18
Dioxide, Caucasian bgs, lcl .....ton	74.75	79.75	74.75	79.75	74.00	79.75
Methanol, pure, nat, drs gal *l*	.63	.73	.63	.73	.63	.76
Synth, drs cl .....gal. *m*	.31	.38	.24	.38	.31	.38
Methyl Acetate, tech tks..lb.	.06	.07	.06	.07	.06	.07
C.P. 97-99%, tks, delv lb.	.09½	.10½	.09½	.10½	.09½	.10½
Chloride, cyl .....lb.	.32	.36	.32	.40	.32	.40
Ethyl Ketone,tks,frt all'd lb.		.08		.08	...	.08
Naphtha, Solvent, tks ...gal.	...	.22	...	.27	...	.27
Naphthalene, crude, 74°, wks tks .....lb.	.0275	.0325	.0275	.0325	...	.0275
Nickel Salt, bbls, NY ....lb.	.13	.13½	.13	.13½	.13	.13½
Nitre Cake, blk .....ton		16.00	...	16.00	...	16.00
Nitrobenzene, drs, wks ...lb.	.08	.09	.08	.09	.08	.09
Orthoanisidine, bbls .....lb.		.70	...	.70	...	.70
Orthochlorophenol, drs ...lb.	.25	.27	.25	.27	.25	.27
Orthodichlorobenzene, drms lb.	.07	.08	.07	.08	.07	.08
Orthonitrochlorobenzene, wks .....lb.	.15	.18	.15	.18	.15	.18
Orthonitrotoluene, wks, dmslb.	...	.09	...	.09	...	.09
Paraldehyde, 98%, wks lcl .....lb.	...	.12	...	.12	...	.12
Chlorophenol, drs .....lb.	.24	.27	.24	.27	.25	.32
Dichlorobenzene, wks ...lb.	.11	.17	.11	.17	.11	.15
Formaldehyde, drs, wks lb.	.21	.22	.21	.22	.21	.24
Nitroaniline, wks, kgs...lb.	.41	.43	.41	.45	.43	.45
Nitrochlorobenzene, wks lb.	...	.15	...	.15	...	.15
Toluenesulfonamide, bbls lb.	...	.70	...	.70	...	.70
Toluidine, bbls, wks ...lb.	...	.48	...	.48	...	.48
Penicillin, ampules per 100,000 units	...	.38	.38	.95	.59	2.40
Pentaerythritol, tech ...lb.	.27	.31	.27	.31	.27	.33
PETROLEUM SOLVENTS AND DILUENTS						
Lacquer diluents, tks, East Coast .....gal.	...	.12½	.11½	.12½	...	.11
Naphtha, East tks, wks .....gal.	...	.12	.11	.12	...	.11
Rubber solvents, East, tks, wks .....gal.	...	.12	.11	.12	...	.11
Stoddard Solvents, East, tks, wks .....gal.	...	.10½	.10	.12	...	.10
Phenol, U.S.P., drs .....lb.	.10½	.12½	.10½	.13	.10½	.11¼
Phthalic Anhydride, cl and lcl, wks .....lb.	.13	.15½	.13	.15½	.13	.14
Potash, Caustics, 88-92%, wks, sol. .....lb.	.06¼	.06¾	.06¼	.06¾	.06¼	.06¾
Flake, 88-92% .....lb.	.07	.07½	.07	.07½	.07	.07½
liquid, 45% basis, tks lb.	...	.02⅞	...	.02⅞	...	.0275
dms, wks .....lb.	.03¼	.03½	.03	.03½	.03	.03½
Carbonate, hydrated 83-85% .....lb.	...	.05½	...	.05½	.05½	.05¾
Chlorate crys, kgs, wks lb.	.11	.13	.11	.13	.11	.13
Chloride, crys, tech, bgs, kgs .....lb.	.08	nom.	.08	nom.	.08	nom.
Cyanide, drs, wks .....lb.	...	.55	...	.55	...	.55
Iodide, bots., or cans ...lb.	1.44	1.48	1.44	1.48	1.44	1.48
Muriatic dom, 60-62-63% K_2O bulk unit-ton ...ton	.53½	.56½	.53½	.56½	.53½	.56
Permanganate, USP, wks dms .....lb.	.20½	.21	.20½	.21	.20½	.21
Sulfate, 90%, basis, bgs ton	36.25	39.25	36.25	39.25	...	36.25
Propane, group 3, tks....gal.	...	.03¾	...	.03¾	...	.03¾
Pyridine, ref., drms .....lb.	.45	.45½	.45	.45½	.45½	.46
R Salt, 250 lb bbls, wks lb.	...	.65	...	.65	...	.65
Resorcinol, tech, drms, wks lb.	.64	.74	.64	.74	.64	.75
Rochelle Salt, cryst .....lb.	.34½	.35	.34½	.47	.43½	.47
Salt Cake, dom, blk wks..ton	...	15.00	...	15.00	...	15.00

l Producers of natural methanol divided into two groups and prices vary for these two divisions; *m* Country is divided in 4 zones, prices varying by zone.

* Spot price is ½c higher.

	Current Low	Current High	1946 Low	1946 High	1945 Low	1945 High
Saltpeter, grn, bbls. ..100 lb.	8.20	9.00	8.20	9.00	8.20	8.60
Shellac, blchd. bone dry, bbls. .....lb.	.71	.74½	.42½	.74½	.42½	.46
Silver Nitrate, bots. 2,500-oz. lots .....oz.	.58¼	.59	.47	.59	.47	.47¾
Soda Ash, 58% dense, bgs, c-l, wks .....100 lb.	...	.90	...	1.15	...	1.15
58% light, bgs cl....100 lb.	1.05	1.18	1.05	1.18	1.05	1.13
Caustic, 76% flake drms, cl .....100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drms,cl 100 lb.	...	2.30	...	2.30	...	2.30
Liquid, 47-49%, sellers, tks .....100 lb.	...	1.95	...	1.95	...	1.95
Sodium Acetate, anhyd. dms .....lb.	.08½	.10	.08½	.10	.08½	.10
Benzoate, USP dms .. lb.	.46	.52	.46	.52	.46	.52
Bicarb, USP, gran., bgs., cl., works .....100 lb.	2.25	2.59	1.55	2.59	1.55	1.90
Bichromate, bgs,wks l.c.l. lb.	.07⅞	.08¼	.07⅞	.08⅛	.07½	.08⅛
Bisulfate powd, bbls, wks .....100 lb.	3.00	3.60	3.00	3.60	3.00	3.60
35° bbls., wks .....100 lb.	1.40	1.65	1.40	1.65	1.40	1.65
Chlorate, kgs, wks c.l....lb.	...	.06½	...	.06¾	...	.06¼
Cyanide, 96-98%, wks ..lb.	.14½	.15	.14½	.15	.14½	.15
Fluoride, 95%, bbls, wks lb.	.07¼	.08¾	.07¼	.08¼	.07¼	.08¼
Hyposulfite, cryst, bgs, cl, wks .....100 lb.	...	2.25	...	2.25	...	2.25
Metasilicate, gran, bbl. wks c-l .....100 lb.	...	3.40	...	3.40	...	2.50
Nitrate, imp, bgs ton	...	38.50	33.00	38.50	...	33.00
Nitrite, 96-98% bbl. cl. lb.	..	.06¾	..	.06¾	...	.06¾
Phosphate, di anhyd. bgs. wks. .....100 lb.	6.00	6.75	6.00	6.75	6.00	7.25
Tri-bgs, cryst, wks 100 lb.	2.70	3.10	2.70	3.10	2.70	3.45
Prussiate, yel, bbls. wks lb.	..	.11	..	.11	...	.11
Silicate, 52°, drs, wks 100 lb.	1.40	1.80	1.40	1.80	1.40	1.80
40°, drs, wks, c-l 100 lb.		.80	...	.80	...	.80
Silicofluoride, bbls NY .lb.	.06½	.07½	.06½	.10	.06½	.10
Sulfate tech, Anhyd, bgs .....100 lb.	1.70	2.20	1.70	2.20	1.70	2.20
Sulfide, cryst c-l, bbls, wks .....100 lb.	...	2.40	...	2.40	...	2.40
Solid, bbls, wks .....lb.	3.15	3.90	3.15	3.90	3.15	3.90
Starch, Corn, Pearl, bgs .....100 lb.	...	4.321	4.321	6.271	...	4.08
Potato, bgs, cl .....lb.	.0735	.0750	.0735	.0750	...	.0637
Rice, bgs .....lb.	no stocks		no stocks		no stocks	
Sweet Potato, bgs .....lb.	no stocks		no stocks		no stocks	
Sulfur, crude, mines ....ton	...	16.00	...	16.00	...	16.00
Flour, USP, precp, bbls, kgs .....lb.	.18	.36	.18	.36	.18	.30
Roll, bbls .....100 lb.	2.40	2.90	2.40	2.90	2.40	2.90
Sulfur Dioxide, liquid, cyl lb.	.07	.08	.07	.08	.07	.09
tks. wks .....lb.	...	.04	...	.04	...	.04
Talc, crude, c-l, NY ....ton	...	15.50	...	15.50	...	13.00
Ref'd, c-l, NY ....ton	17.50	21.00	13.00	21.00	13.00	21.00
Tin, crystals, bbls, wks. ..lb.	no stocks		no stocks		no stocks	
Metal .....lb.	...	.52	..	.52	...	.52
Toluol, drs, wks .....gal.	...	.27	.27	.32	...	.33
tks, frt all'd .....gal.	...	.22	.22	.27	...	.28
Tributyl Phosphate, dms lcl, frt all'd .....lb.	...	.49	...	.49	...	.47
Trichloroethylene,dms,wks lb.	.08	.09	.08	.09	.08	.09
Tricresyl phosphate tks ...lb.	...	.24	...	.24	...	.24
Triethylene glycol, dms....lb.	.18½	.19½	.18½	.19½	.18½	.19½
Triphenyl Phos, bbls .....lb.	.31	.32	.26	.32	.26	.31
Urea, pure, cases .....lb.	...	.12	...	.12	...	.12
Wax, Bayberry, bgs .....lb.	no stocks		no stocks		no stocks	
Bees, bleached, cakes ..lb.	.68	.70	.60	.70	no-stocks	
Candelilla, bgs crude ..lb.	.77	.78	.62	.86	.35	.36
Carnauba No. 1, yellow, bgs, ton .....lb.	1.90	1.95	1.80	2.04	no stocks	
Xylol, Indus. frt all'd, tks, wks .....gal.	...	.22	...	.26	...	.27
Zinc Chloride tech fused, wks .....lb.	.05	.0535	.05	.0535	.05	.0535
Oxide, Amer, bgs, wks. lb.	.08	.08¼	.07	.08¾	.07	.07½
Sulfate, crys, bgs...100 lb.	3.40	4.15	3.40	4.15	3.40	4.15

OILS AND FATS

Babassu, tks .....lb.	no prices		.11	.12	...	.111
Castor, No. 3, dms. c.l. ...lb.	...	.27¾	...	.27¾	.13¾	.14¼
China Wood, drs, spot NY lb.	.39	.41	.39	.41	.39	.41
Coconut, edible, drs NY. .lb.		.0985		.0985		.0985
Cod, USP, bbls., dms. ..gal.	2.60	3.80	2.15	3.80	.85	.90
Corn, crude, tks, wks ..lb	no prices		....	.12¾	...	.12¾
Linseed, Raw, dms, c-l ...lb.	...	.353	.1680	.353	...	.1550
Menhaden, crude tks	.21½	nom.	.1220	.21½	...	.1225
Light, pressed, drs l.c.l lb.	no prices		.1300	.1620	...	.1300
Palm, Niger, dms .....lb.	no prices		...	.0865	...	.0865
Peanut, crude, tks, f.o.b. wks .....lb.		.27	.12⅞	.27	.12⅞	.13⅞
Perilla, crude dms, NY .lb.	no stocks		no stocks		no stocks	
Rapeseed, bulks .....lb.	...	no price	...	.13	...	.156½
Red, dms .....lb.	29¾	.30¾	.13¼	.30¾	.12¼	.14¼
Soy Bean, crude, tks, wks lb.	.2400	.2450	.1175	.2450	...	.1175
Tallow, acidless, bbls.....lb.	...	no prices	...	.14¼	...	.14¼

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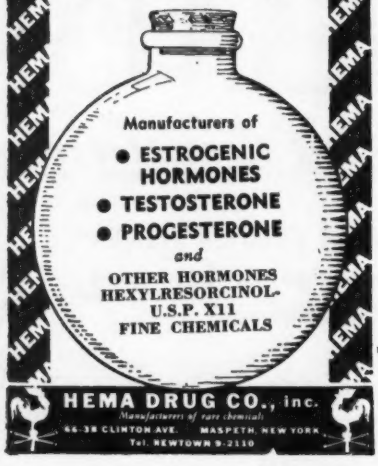

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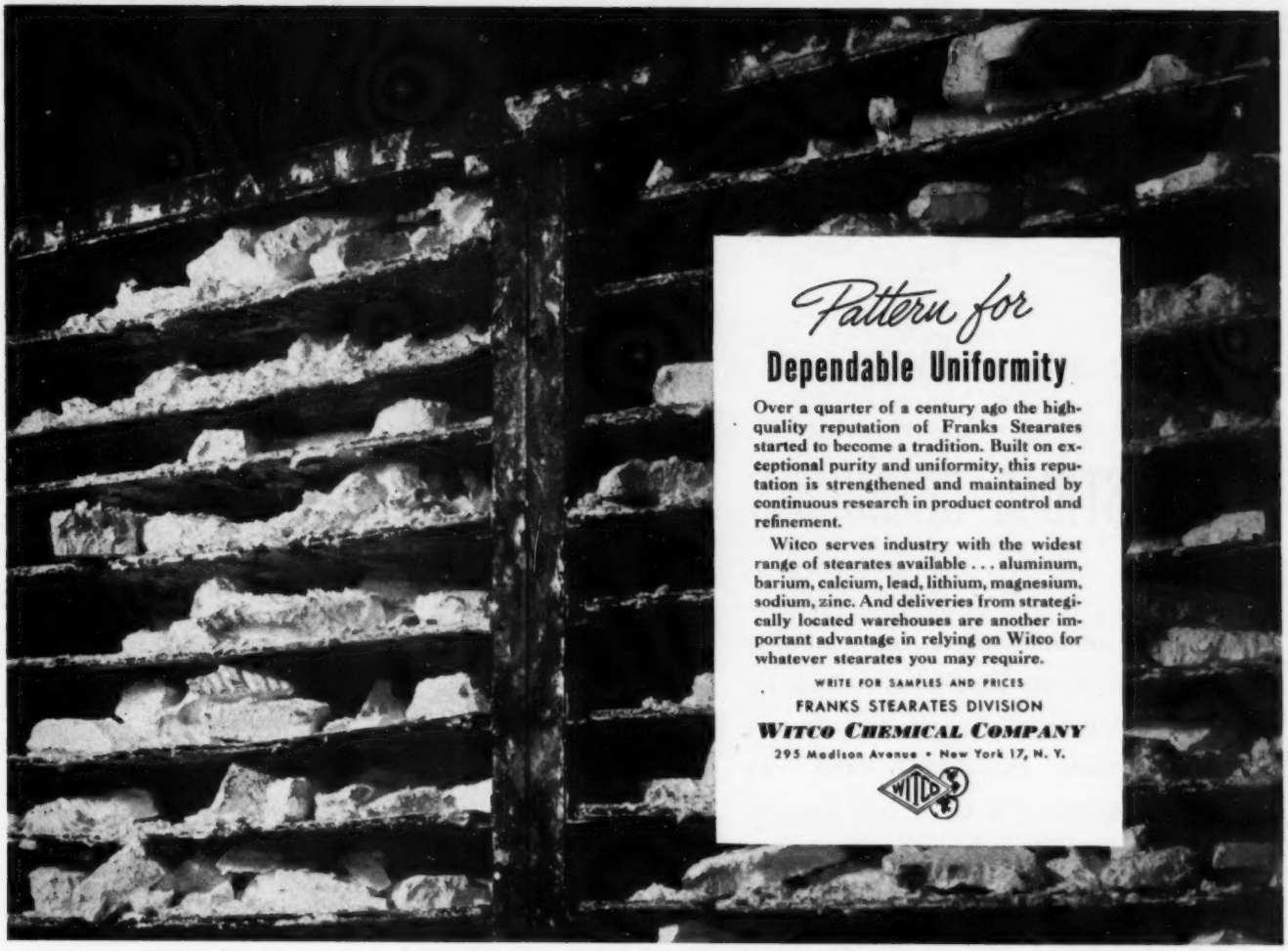
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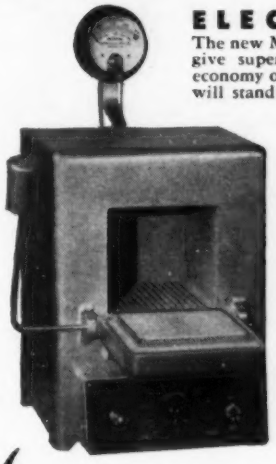

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"WE"– EDITORIALLY SPEAKING

DO YOU KNOW what's stirring biological chemistry circles these days? The water content of oysters. It is measured by boiling them under reduced pressure with benzene or toluene and collecting the water. Interesting, but we confess that we're more interested in the oyster content of stew than the water content of oysters. The former is too often, alas, far too low.

WE WERE AWARE that synthetic ion-exchange resins were good for lots of things, but we weren't quite prepared to learn that they are useful in the treatment of peptic ulcers. We foresee the day when harassed chemists and chemical engineers will pop resin tablets in their mouths after each meal and have a unit process going on right under their belts.

A SHORT STORY WRITER in one of the popular magazines refers to "ascetic acid." Didn't fool us for a minute. It's made by distilling the bones of a clean living and high thinking old hermit.

THE DEATH of Gertrude Stein is justly mourned in the more esoteric literary and artistic circles. It will come as a thrilling surprise to them to learn that a worthy successor has appeared. To prove it, we quote a few words from a news release that just came in: ". . . desirable pigments, but pigment, but pigment manufacturers . . . . "

THE DERIVATION of words has always held a great fascination for us, for often centuries of history and human striving are crystallized in a single word. Such is the case with "ammonia," whose derivation we just learned from the *Durez Molder*. It derives its name from the temple of Ammon, in Egypt, where priests made it by concentrating camel dung left by caravans of pilgrims and called their products "salts of Ammon." What a distance we have traveled from the dung piles of Egypt to the modern ammonia plants of our own country!

ATOMIC SCIENTISTS, attention! The War Assets Administration announces as surplus several magnesium-alloy rocket-launching tubes. One model described is 7½ feet long, 4½ inches in diameter and 3/16 inch thick, weighing 2000, yes, 2000 lbs. After much slipping back and forth of our slide rule, we calculate that the density is 255—or 22 times as heavy as lead. If atoms like that aren't fissile as all get out, they should make mighty fine radiation shields!

A Merry Christmas and a Happy New Year!

John R. Thompson
Bob Taylor
Charlie Todaro
Howard C. E. Johnson
Florence Sanders
Alex Jordan
Olga E. Varcam
Truman W. Zabel
Bob Baldwin
Don Harway
Bill Hammon
Robert S. McGraw
Frank C. Wahaka Jr.

FIFTEEN YEARS AGO

(From Our Files of Dec., 1931)

The Muscle Shoals Commission reports unanimously to President Hoover that operation of the property is both economically feasible and desirable, and that private operation under lease is preferable to governmental operation. Senator Norris in favor of government operation, says of the report, "It looks like it's full of tricks."

DuPont chemists announce a new synthetic rubber, "Duprene", made by polymerizing chloroprene, which in turn is obtained by adding hydrogen chloride to vinylacetylene, a product of acetylene dimerization.

THIRTY YEARS AGO

(From Our Files of Dec., 1916)

Thomas A. Edison says in an interview that we will never be able to compete with Germany in the manufacture of dyes. "Germany can make them better and cheaper than we can and we should buy them from Germany," the Wizard of Orange declares.

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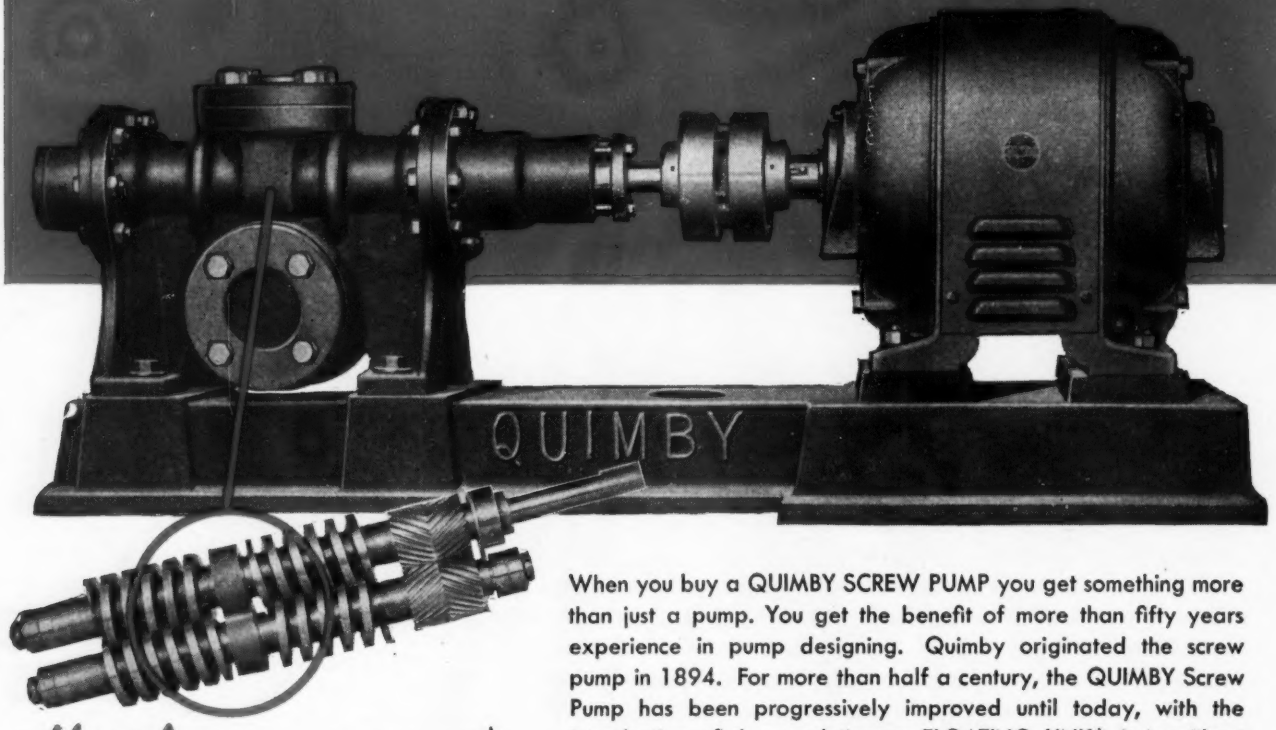

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Abstracts of U. S. Chemical Patents

A Complete Checklist Covering Chemical Products and Processes

Printed copies of patents are available from the Patent Office at 10 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

From Official Gazette—Vol. 589, Nos. 2, 3, 4—Vol. 590, Nos. 1, 2 (August 13—September 10)—p. 733

**Petroleum*

Alkylation process comprises reacting isoparaffin with olefin in presence of aluminum chloride-hydrocarbon complex in first alkylation stage, separating resultant hydrocarbon alkylate, introducing fresh aluminum chloride into alkylation stage, withdrawing controlled amounts of aluminum chloride-hydrocarbon complex, etc. No. 2,405,490. Joseph Chenicek and Ralph Thompson to Universal Oil Products Co.

Isomerizing isomerizable saturated hydrocarbon comprises subjecting hydrocarbon to contact with isomerizing catalyst of Friedel-Crafts type in presence of mono-cyclic aromatic hydrocarbon. No. 2,405,516. Herman Pines to Universal Oil Products Co.

**Photographic*

Anti-static laminated photographic film which comprises a base of electrifiable highly polymeric colloid, layer of photosensitive emulsion thereon, layer of intermolecular polycondensation product of organic polybasic acid and hydroxy primary mono amine. No. 2,403,533. Frank Kaszuba to General Aniline & Film Corp.

Light-sensitive silver halide emulsion layer diffusely containing p-nitraniline or m-nitraniline. No. 2,403,708. Edward Davey and Edward Selwyn to Eastman Kodak Co.

Multilayer photographic film comprising support having thereon silver halide emulsion layer containing coupler, and over emulsion layer an exposed layer of water-permeable colloid containing organic reducing agent containing an aliphatic group having carbon chain of at least 8 carbon atoms. No. 2,403,721. Edwin Jelley and Paul Vittum to Eastman Kodak Co.

Detecting camouflage materials by photography, which comprises photographing suspected object on multilayer photographic material. No. 2,403,722. Edwin Jelley and Lot Wilder to Eastman Kodak Co.

Multilayer material for polarizing light. No. 2,403,731. Stephen MacNeille to Eastman Kodak Co.

Improving photographic silver halide emulsions comprises treating emulsion, not later than development, with small quantity of 5-mercaptotetrazole, in 1-position thereof group from class of hydrogen atom and hydrocarbon radical. No. 2,403,927. John Kendall, Douglas Fry and James Brooks to Ilford Ltd.

Photographic frame rack. No. 2,404,117. Joseph Worth.

Device for developing exposed photographic prints, comprising open topped receptacle, perforated conveyor for moving prints individually, applicator means for spraying developer solution onto upper face of prints, etc. No. 2,404,138. Alvin Mayer.

Development of gelatino silver halide emulsion comprises developing such emulsion in developer containing compound of general formula described in patent. No. 2,404,774. Fritz Dersch and Newton Heimbach to General Aniline & Film Corp.

Photographic element comprising support having light-sensitive layer and layer containing colloidal dispersion of polymethine dye and anionic dispersing agent, water-soluble salts of alkyl naphthalene sulfonates, water-soluble salts of esters of sulfo aliphatic di-carboxylic acids, or tannic acid. No. 2,405,106. Jules Widmer and Burt Carroll to Eastman Kodak Co.

Apparatus for development of negatives. No. 2,405,160. John Morse.

Photographic film developing tank for strip type film, film may be observed throughout entire development. No. 2,405,233. Robert Peckham.

**Polymers*

Sound-record composition for production of tough, flexible, abuse-resistant grooved records, consisting of mixture of 25-50% thermoplastic cellulose aceto-propionate containing acetyl and propionyl groups, resin comprising glycerol phthalate modified with benzoic acid, plasticizer for aceto-propionate, and hard wax. No. 2,403,448. James Massarene to Interchemical Corp.

Manufacture of synthetic resins by reaction of urea and urea derivatives with formaldehyde, comprising applying heat to condense together monoalkyl urea, urea, unsubstituted monohydric aliphatic alcohol and formaldehyde. No. 2,403,450. Paul Morton and John Olin to Sharples Chemicals, Inc.

Improving oriented fibers of hydrolyzed interpolymers of ethylene with vinyl organic ester which comprises reacting oriented fibers with methylol or alkoxy-methyl derivatives of uron, melamine, urea and diamides. No. 2,403,464. Albert Smith to E. I. du Pont de Nemours & Co.

Reacting hydrolyzed interpolymer of ethylene and vinyl acetate, with compound having plurality methylene groups attached to nitrogen and oxygen to form insoluble product having melting point higher than interpolymer. No. 2,403,465. Donald Pease to E. I. du Pont de Nemours & Co.

Extrusion die having surface to be contacted by material to be extruded, consisting of tetrafluoroethylene polymer. No. 2,403,476. Kenneth Berry and Joseph Downing to E. I. du Pont de Nemours & Co.

Enclosing articles in elastic sheet material, etc. No. 2,403,482. William Cloud.

Plastic binder forming machine comprising framework, table, movable flexible endless support, follower supported on flexible support above table for positioning a plastic blank, etc. No. 2,403,644. Charles Emmer to General Binding Corp.

Selective polymerization of tertiary-base olefins associated with nontertiary-base olefins, which comprises subjecting liquid hydrocarbon mixture which contains olefins to polymerizing action of tin tetrahalide associated with ketone. No. 2,403,779. Grant Bailey to Phillips Petroleum Co.

Metal fastening having coating consisting of Cumar of CX grade, gil-

* *Continued from Vol. 588, Nos. 2, 3, 4, 5, Vol. 589, No. 1.*

(*Continued on page 1131*)

Patents Available for License or Sale

The Patent Office is regularly publishing a Register of Patents Available for Licensing or Sale. Patents concerning chemical products and processes appear below.

October 15, 1946

Pat. 2,067,060. **Method of Treating Pigments.** Patented Jan. 5, 1937. Provides a method of coating or impregnating carbon black or other pigments with wetting and/or softening agents in an atmosphere of carbon dioxide at elevated pressures and temperatures, such temperature being sufficiently high to volatilize the treating agents. The carbon dioxide acts as a carrying and dispersing vehicle. Upon release of the pressure the treating agents remain substantially uniformly dispersed throughout the carbon black while the carbon dioxide is given off. This treatment facilitates incorporation of the treated material into rubber. Paint pigments may be treated in the same manner with suitable wetting or emulsifying agent. Group 30—11.

Pat. 2,095,673. **Method of Treating Rubber.** Patented Oct. 12, 1937. Group 30—1.

Pat. 2,148,572. **Method of Treating Rubber.** Patented Feb. 28, 1939. Group 30—1.

These two patents provide a method for treating crude rubber in the presence of carbon dioxide at elevated pressures and temperatures to break down the rubber, and the incorporation of various treating agents thereinto without prolonged milling at heavy pressures. Pieces of crude rubber, with or without treating agents, are placed in an enclosed vessel and part of the air evacuated therefrom. The evacuated air is replaced by a regulated amount of carbon dioxide. The vessel is heated to a temperature of at least 330° F. and the pressure maintained preferably at 50 lbs. per square inch during the mixing operation.

Pat. 2,180,304. **Apparatus for Molding Sponge Rubber.** Patented Nov. 14, 1939. Groups 30—52; 35—59.

Pat. 2,199,006. **Sponge Rubber Article and Method of Making Same.** Patented Apr. 30, 1940. Groups 30—52; 35—59.

The two patents listed above cover a sponge rubber article, such as a cushion having tubular passages therein, and a molding apparatus and method for making the same. Apparatus consists of a mold having removable supports for holding a plurality of rows of pipes or rods in spaced relation. Alternate layers of rubber and rows of pipes are placed in the mold. Application of heat in a well known manner unites the layers around the pipes into a single mass leaving a multiplicity of parallel tubular passages, preferably open at their ends, after the supports and pipes have been removed. The surface layers may be of different density, or have other characteristics, in order to improve the appearance, as well as to facilitate the application of trade-marks, designs, etc.

October 22, 1946

Pat. 1,875,184. **Liquid Ink Eraser for Pocket Fountain Pens and Desk Set Fountain Pens.** Patented Aug. 30, 1932. A plug in end of fountain pen has a removable, compressible sack which holds ink eradicator. When spring influenced ball valve is depressed, liquid flows through sleeve and rolls over surface to be erased. A removable shield holds pen point and protects sack. May also be used to house writing fluids and draw wide lines, mark boxes, etc. Filling operation is similar to that of fountain pen. (Owner) Frank N. Steigleder, 15 Boylston St., Boston, Mass. Group 39—51. Reg. No. 4,164.

Pat. 2,356,329. **Method for the Separation and Reclamation of Copper from Printing Plates and the Like.** Patented Aug. 22, 1944. A method for the recovery of copper from printing plates made of an alloy of lead, antimony, and tin on which a layer of copper and nickel has been deposited. The nickel is first electrolytically stripped and the stripped surface coated with calcium oxide or any other whiting. Direct heat is applied at a temperature sufficient to melt the "base" metal, leaving a thin copper shell. The shell is then heated and suddenly cooled, knurled to break up the scale and then mechanically and chemically cleansed and used as the anode to deposit copper on new plates or cylinders. (Owner) The Crowell Collier Publishing Company. Address correspondence to Campbell, Brumbaugh & Free, 90 Broad St., New York 4, N. Y. Group 35—55. Reg. No. 4,160.

The following patent, owned by the United States Government, as represented by the Secretary of the Interior, is available for licensing, upon a non-exclusive, royalty-free basis:

Pat. 2,395,475. **Beneficiation of Beryllium Ores.** Patented Feb. 26, 1946. (Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757.) Produces high grade beryllium ore concentrate from low grade beryllium deposits. Comprises subjecting comminuted ore to a pre-treatment to remove iron and

(*Continued on following page*)

(Continued from preceding page)

then to a mineral concentrating treatment involving selective filming under acidic conditions of a desired constituent in the presence of a soluble fluoride, a long-chain fatty acid and a long-chain alkyl amine salt. Group 34—1. Reg. No. 4,167.

October 29, 1946

Pat. 2,400,371. **Self-Adapting and Adjusting Depth Gauge.** Patented May 14, 1946. A cylindrical casing with calibrated scales has an indicator rod surrounded by a coiled spring slidable therein for measuring depth. The projecting end of rod is the same length as scaled slot in casing and the lower end rests against a collar. Whatever distance rod is forced into tube the slide travels the same distance in stationary gauge casing. (Owners) Woodrow W. Reeser and Lucille E. Reeser. Address correspondence to Woodrow W. Reeser, 334 Concord Ave., Elyria, Ohio. Groups 35—65; 38—31. Reg. No. 4,181.

Pat. 2,402,868. **Packing for Pipe Joints.** Patented June 25, 1946. A multiple safety seal for coupling different adjacent pipe sections together is formed by two semi-circular sections which are fitted around the pipe and bolted together edgewise. The central openings of the sections are grooved to receive beads formed on the pipe wall. A tight seal is formed by bolting the two sections together slightly out of register. The flat faces of the sections are each provided with a pair of separate channels which are filled with flax or any other packing material to provide an absolute seal against loss of fluids. (Owner) Frank W. Boyle, 9515 Baltimore Ave., Berwyn, Md. Group 32—93. Reg. No. 4,197.

November 5, 1946

Pat. 2,058,980. **Process for Hydrating Caustics and Dehydrating Hydrous Salts.** Patented Oct. 27, 1936. If during the reaction of caustic and hydrous salts (as in the making of plaster, etc.) water vapor is circulated through the tumbling mass by means of a carrier gas, a better product of finer texture will result. The usual heat of reaction, if conserved within the circulating apparatus, is adequate to carry on the full reacting process if no heat is lost by radiation, otherwise the atmosphere in circulation may be heated extraneously. (Co-owner) Anna W. Choate, County Road, Essex, Mass. Group 32—72. Reg. No. 4,209.

Pat. 2,021,412. **Reacting Caustic Lime with Gypsum.** Patented Nov. 19, 1935. Group 32—72. Reg. No. 4,210.

Pat. 2,063,488. **Process for Reacting Caustic Lime and Gypsum.** Patented Dec. 8, 1936. Group 32—72. Reg. No. 4,211.

These two patents relate to the formation of a more desirable building plaster which results from the initiation of the "temperature of reaction" by the application of heat to a small portion of a mixture of caustic lime and gypsum so that the reaction is extended throughout the whole mass. The process may be conducted in a container where heat may be applied at the bottom by a gas burner, steam jacket, etc. (Co-owner) Anna W. Choate, County Road, Essex, Mass.

Pat. 2,127,952. **Process of Making Reacted Plaster.** Patented Aug. 23, 1938. Group 32—72. Reg. No. 4,212.

Pat. 2,261,872. **Continuous Process for Making Reacted Plaster.** Patented Nov. 4, 1941. Group 32—72. Reg. No. 4,213.

These two patents are similar to Patents 2,021,412, 2,058,980, and 2,063,488 in that they involve the utilization of heat by one substance of the heat thrown off by the other to insure a reaction between a caustic lime and hydrous gypsum mixture in the making of plaster. The process involves tumbling the mixture to insure looseness and proper aeration so that the reaction is even and complete. Patent 2,127,952 relates only to separate batches whereas Patent 2,261,872 pertains to a continuous process. The latter patent requires graduated feeding of the mixture, a moving atmosphere, a constant zone temperature in a series of hearths, etc. (Owner) Anna W. Choate, County Road, Essex, Mass.

Pat. 2,339,545. **Adhesive Tape.** Patented Apr. 30, 1946. In this patent, the conventional adhesive tape (usually sold in rolls or sheets) is made handier to use. The usual strip is perforated and provided with spaced nicks or cuts along each edge, and the adhesive backing (instead of being spread solidly) is applied in spaced rows, resulting in a considerable saving. These features offer several advantages: The nicks along the edges enable the user to tear the tape to a more exact length without the use of shears; the perforations not only allow the circulation of air but permit use of solutions in the treatment of sprains and swellings without removing the dressing; the spaced rows make strappings less painful to remove. (Owner) Bernard E. Davis, 239 Prospect Place, Brooklyn 17, N. Y. Group 39—16. Reg. No. 4,205.

The following patent, owned by the United States Government, as represented by the Secretary of the Interior, is available for licensing, upon a non-exclusive, royalty-free basis:

Pat. 2,407,651. **Concentrating Fluorspar by Froth Flotation.** Patented Sept. 17, 1946. (Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757). This patent relates to an economical process for separating fluorspar from calcareous gangue materials such as calcite or limestone. The crushed ore is conditioned with lignin sulphonate used in conjunction with an additional agent (such as sodium fluoride) and a fatty acid collector agent (such as oleic cid). A pH modifying agent and slime dispersant may be used if desired. The pulp is then froth floated by usual mechanical or pneumatic methods to yield an enriched fluorspar froth and a tailings product essentially free of fluorspar and containing the gangue material. The froth is then repulped with additional water and refloated to recover the fluorspar and reject the remaining gangue material. An additional cleaning step is sufficient to yield a fluorspar concentrate of desired commercial grade. Various modifications and examples cited. Groups 28—34; 32—95. Reg. No. 4,232.

November 12, 1946

Pat. 2,374,870. **Vacuum Distillation Apparatus.** Patented May 1, 1945. Groups 28—24—29; 29—11; 35—51. Reg. No. 4,249.

Pat. 2,266,053. **Vacuum Distillation Method.** Patented Dec. 16, 1941. Groups 28—24—29; 29—11; 35—51. Reg. No. 4,250.

These two patents cover a method and apparatus for fractional distillation or refining of a wide variety of products, including various mineral, vegetable, and animal oils, or petroleum products. A vertical fractionating column is provided with a plurality of cups round it inner walls leaving a substantially unobstructed passage for free movement of vapors. The cups continuously collect condensate fractions which overflow into the next lower cup. A depending lip surrounding the throat of the vessel containing the mother liquid prevents such liquid from washing-up and intermingling with the fraction in the lowermost cup. A spaced, sealed jacket surrounds the fractionating column and freely communicates with the top of such column to collect a fraction from the region above the uppermost cup. (Co-owner) Jesse L. Markel, 230 Moncada Way, San Francisco 12, Calif.

November 19, 1946

The following patents and application owned by the American Air Filter Company, a corporation of Delaware, having a principal place of business at 215 Central Ave., Louisville, Ky., have been dedicated to the people of the United States of America by instrument recorded in the United States Patent Office on September 21, 1946.

The instrument reads in part as follows:

—does hereby assign and transfer to the people of the United States of America the entire right, title and interest in and to the United States Letters Patent and patent applications listed—

Pat. 1,738,249. **Air and Gas Filter.** Patented Dec. 3, 1929.
Pat. 1,743,675. **Air Filter.** Patented Jan. 14, 1930.
Pat. 1,746,283. **Air Filter.** Patented Feb. 11, 1930.
Pat. 1,747,694. **Air Filter.** Patented Feb. 18, 1930.
Pat. 1,751,999. **Apparatus for Filtering Air.** Patented Mar. 25, 1930.
Pat. 1,753,653. **Air Filter.** Patented Apr. 8, 1930
Pat. 1,757,690. **Filter Mat.** Patented May 6, 1930.
Pat. 1,758,881. **Filtration Medium.** Patented May 13, 1930.
Pat. 1,765,720. **Air and Gas Filter.** Patented June 24, 1930.
Pat. 1,771,639. **Air Filter.** Patented July 29, 1930.
Pat. 1,771,846. **Air Filter.** Patented July 29, 1930.
Pat. 1,783,194. **Apparatus for Cleaning Air-Filter Cells.** Patented Dec. 2, 1930.
Pat. 1,786,208. **Dust Separator.** Patented Dec. 23, 1930.
Pat. 1,788,164. **Air Filter.** Patented Jan. 6, 1931.
Pat. 1,789,931. **Air Filter.** Patented Jan. 20, 1931.
Pat. 1,794,115. **Air Filter.** Patented Feb. 24, 1931.
Pat. 1,806,898. **Automatic Self-Cleaning Automobile Filter.** Patented May 26, 1931.
Pat. 1,807,950. **Cleaning System and Device for Air Filters.** Patented June 2, 1931.
Pat. 1,807,983. **Air or Gas Purifier.** Patented June 2, 1931.
Pat. 1,807,984. **Air Filter.** Patented June 2, 1931.
Pat. 1,816,836. **Process for Cleaning and Coating Air Filters.** Patented Aug. 4, 1931.
Pat. 1,816,854. **Filter Apparatus.** Patented Aug. 4, 1931.
Pat. 1,816,855. **Filter Apparatus.** Patented Aug. 4, 1931
Pat. 1,821,211. **Double Passage Filter and Closure for the Same.** Patented Sept. 1, 1931.
Pat. 1,831,782. **Automatic Spray Header for Horizontal Self-Cleaning Filters.** Patented Nov. 10, 1931.
Pat. 1,834,534. **Plate for Air Filters.** Patented Dec. 1, 1931.
Reg. 18,328. **Method for Cleaning and Charging Air Filter Mediums.** Patented Jan. 12, 1932.
Pat. 1,841,536. **Filters for Gas, Air and the Like.** Patented Jan. 19, 1932.
Pat. 1,848,334. **Air Cleaner.** Patented Mar. 8, 1932.
Pat. 1,865,245. **Apparatus for Cleaning and Charging Air Filters.** Patented June 28, 1932.
Pat. 1,870,196. **Air Filter.** Patented Aug. 2, 1932.
Pat. 1,895,597. **Automatic Flushing Device.** Patented Jan. 31, 1933.
Pat. 1,895,618. **Air Filter Device.** Patented Jan. 31, 1933.
Pat. 1,895,619. **Air Cleaner.** Patented Jan. 31, 1933.
Pat. 1,895,642. **Filter Unit.** Patented Jan. 31, 1933.
Pat. 1,899,007. **Renewable Filter.** Patented Feb. 28, 1933.
Pat. 1,899,017. **Apparatus for Filtering Air.** Patented Feb. 28, 1933.
Pat. 1,899,018. **Filter.** Patented Feb. 28, 1933.
Pat. 1,899,028. **Air Filter.** Patented Feb. 28, 1933.
Pat. 1,913,885. **Means for Cleaning Air Filters.** Patented June 13, 1933.
Pat. 1,926,933. **Air Filter.** Patented Sept. 12, 1933.
Pat. 1,941,450. **Air Filter.** Patented Jan. 2, 1934.
Pat. 1,941,524. **Air Filter Apparatus.** Patented Jan. 2, 1934.
Pat. 1,949,540. **Air Filter.** Patented Mar. 6, 1934.
Pat. 1,978,459. **Fan or Blower Housing.** Patented Oct. 30, 1934.
Pat. 1,995,378. **Air Filter.** Patented Mar. 26, 1935.
Pat. 2,029,406. **Air or Gas Filter Unit.** Patented Feb. 4, 1936.
Pat. 2,056,001. **Impermanent Air Filter Medium.** Patented Sept. 29, 1936.
Pat. 2,167,323. **Filtering Medium for Air Filters.** Patented July 25, 1939.
Pat. 2,220,347. **Automatic Stack Type Air Filter.** Patented Nov. 5, 1940.
Application Serial No. 442,742. **Blower.** Filed May 13, 1942.

The above listed patents and application are all directed to removing dust or other foreign matter from air. Construction and operation of various types of filters and filter mediums are described. Use of filters for different types of installations is set forth in some of the patents.

Methods of coating and cleaning filters without removing them from the operating unit are described in several of the patents. Group 35—64.

A brief description of the above patents will be included in the "Supplement" to Dedicated Patents to be published about November 15, 1946.

Copies of the supplement will be mailed upon request.

(*Continued from page 1129*)

sonite, plasticizing oil, asbestine, red oxide of iron. No. 2,403,783. Willis Boak to The American Steel & Wire Co. of New Jersey.

Interpolymer of methylene malonic ester and unsaturated alkyd resin. No. 2,403,791. Gaetano D'Alelio to General Electric Co.

Visible-light transparent plastic comprising polymeric methyl methacrylate and, in admixture therewith, thorium nitrate, bismuth nitrate or bismuth trichloride, in amount sufficient to reduce ability to transmit X-ray radiations. No. 2,403,794. Richard Goldrick and Barnard Marks to E. I. du Pont de Nemours & Co.

Making glass fiber-resin combinations comprises applying to glass fiber fabric aqueous solution of potentially reactive unreacted mixture of formaldehyde and resorcinol. No. 2,403,872. Kenneth Miller to Owens-Corning Fiberglas Corp.

Treatment of styrene to modify properties, comprises incorporation in styrene of sodium bisulfite, sodium sulfate or sodium bisulfate, to promote solidification of styrene, heating mixture above 100° C. until material produced is harder than without modifying agent. No. 2,403,962. Laszlo Auer.

Polymerization process in which isoolefin of 4 to 8 carbon atoms is polymerized with diolefin of 4 to 12 carbon atoms at temperature of from −20° to −160° C., by means of solution of Friedel-Crafts catalyst in alkyl halide, conducting polymerization in presence of inert deflocculating agent, separating polymer in dispersed form, slurrying polymer in water. No. 2,403,966. John Brown, Jr., and Irving Lightbown to Standard Oil Development Co.

Nitrocellulose-compatible resin comprises pentaerythritol triabietate-mono-(monobutyl maleate) and is product of reaction of pentaerythritol, rosin, butyl alcohol, maleic anhydride. No. 2,404,033. Harry Burrell to Heydeh Chemical Corp.

Making wheel dressing tool, the steps include providing form with charge of diamond crystals and alloy consisting of silver, copper, phosphorus, diamonds sparsely distributed, heating alloy with diamond crystals in situ to liquid, permitting crystals to adjust in liquid alloy, cooling mixture in form. No. 2,404,184. William Ludel.

Resin bonded composite abrasive article having two dissimilar abrading bodies integrally united by compatible resin bonds of constituent abrasive bodies. No. 2,404,192. Kernell Ries, Norman Robie and Phyllis von Doenhoff to The Carborundum Co.

Polymerizing composition comprising solution of divinyl benzene in dialkyl benzene, in presence of vinyl acetate and catalyst for polymerization, isolating partially polymerized product, vinyl acetate and divinyl benzene being present in solution. No. 2,404,220. Gaetano D'Alelio to General Electric Co.

Transparent resin comprising polymer of cyclohexylhexyl methacrylate. No. 2,404,268. Carl Barnes to Polaroid Corp.

Methacrylic ester and copolymers. No. 2,404,292. Mark Hyman, Jr., to Polaroid Corp.

Process comprises polymerizing propylene, subjecting resultant polymers to action of olefin isomerizing catalyst at isomerizing conditions, alkylating an alkylatable hydrocarbon with portion of isomerized propylene polymer. No. 2,404,340. Gordon Zimmerman to Universal Oil Products Co.

Providing solid methyl methacrylate polymer with improved surface characteristics comprises applying to surface of polymer coating solution comprising ethyl silicate hydrolyzed 15%, water, and partially hydrolyzed vinyl acetate polymer, etc. No. 2,404,357. Max Bechtold to E. I. du Pont de Nemours & Co.

Preparing completely halogenated polyfluorocycloparaffins. No. 2,404,374. Jesse Harmon to E. I. du Pont de Nemours & Co.

Providing solid organic polymer with improved surface characteristics comprises coating surface of polymer with coating solution comprising acid polysilicic acid ester of alcohol, polymer containing hydroxyl groups, volatile organic solvent, drying coating, baking coating. No. 2,404,426. Max Bechtold and Paul Pinkney to E. I. du Pont de Nemours & Co.

Making sheet material, comprising endless conveyor and means for driving same, doctor blade spanning horizontally disposed reach of conveyor, vertically adjustable beam spanning conveyor, means for maintaining pool of fluent composition on conveyor, etc. No. 2,404,582. George Bosomworth to The Firestone Tire & Rubber Co.

Polymerizing propylene comprises passing propylene through mass of polymerization catalyst consisting of calcined mixture of precipitated silica, alumina and zirconia, etc. No. 2,404,628. John Grenko and Lynn Strawn to The Texas Co.

Machine for extrusion plastic material, comprising one pair screwthread impelling devices each having its own feed opening, readily removable feed chamber, pair of driven feed rolls for feeding plastic material into end of feed chamber, etc. No. 2,404,630. Francis Griffiths to W. T. Henley's Telegraph Works Co., Ltd.

Readily combustible plastic polymer of an ester having the formula described in patent. No. 2,404,688. Herman Bruson and George Butler to Rohm & Haas Co.

Polymerization products from aromatic carbonyl compounds and aromatic vinyl compounds. No. 2,404,711. Ullrich Hoffmann and Helmut Meis.

Forming clear, colorless solutions of acrylonitrile polymer containing combined acrylonitrile, comprises commingling polymer in finely divided form with solvent at high temperatures, maintaining polymer in discrete particles, heating mass to temperature at which solvent dissolves polymer. No. 2,404,713. Ray Houtz to E. I. du Pont de Nemours & Co.

Composition of matter, polymer containing 85% by weight acrylonitrile and dimethyl carbamyl compound, formula described in patent. No. 2,404,714. George Latham to E. I. du Pont de Nemours & Co.

Composition of matter, polymer containing 85% by weight acrylonitrile dissolved in organic nitrile compound embraced by formula described in patent. No. 2,404,715. Arthur Rogers to E. I. du Pont de Nemours & Co.

Composition of matter, polymer containing 85% by weight acrylonitrile dissolved in dimethyl amide nitrile compound, formula described in patent. No. 2,404,716. Virgil Hansley to E. I. du Pont de Nemours & Co.

Composition of matter, polymer containing 85% by weight acrylonitrile and compound described in patent. No. 2,404,717. Ray Houtz to E. I. du Pont de Nemours & Co.

Composition of matter, polymer containing 85% by weight acrylonitrile dissolved in organic thiocyanomethylene compound described in patent. No. 2,404,718. Ray Houtz to E. I. du Pont de Nemours & Co.

Composition of matter, polymer containing 85% by weight acrylonitrile dissolved in cyclic organic compound composed of single 3-8 membered ring containing within ring grouping described in patent. No. 2,404,719. Ray Houtz to E. I. du Pont de Nemours & Co.

Composition of matter, polymer 85% by weight acrylonitrile dissolved in aromatic compound taken from group listed in patent. No. 2,404,720. Ray Houtz to E. I. du Pont de Nemours & Co.

Composition of matter, polymer containing 85% by weight acrylonitrile dissolved in cyclic compound comprising 4-7 membered ring containing within ring one sulfoxy group taken from class described in patent. No. 2,404,722. Ray Houtz to E. I. du Pont de Nemours & Co.

Composition of matter, polymer containing 85% by weight acrylonitrile dissolved in aromatic compound taken from group listed in patent. No. 2,404,721. Ray Houtz to E. I. du Pont de Nemours & Co.

Composition of matter, polymer containing 85% by weight acrylonitrile dissolved in organic compound described in patent. No. 2,404,723. Richard Merner to E. I. du Pont de Nemours & Co.

Composition of matter comprising containing 85% by weight acrylonitrile dissolved in N,N-dimethylmethoxyacetamide. No. 2,404,724. Ray Houtz to E. I. du Pont de Nemours & Co.

Composition of matter comprising polymer containing 85% by weight acrylonitrile dissolved in N,N-dimethylcyanamide. No. 2,404,725. Arthur Rogers to E. I. du Pont de Nemours & Co.

Composition of matter comprising polymer containing 85% by weight acrylonitrile and hydracrylonitrile or glycolonitrile. No. 2,404,726. William Charch to E. I. du Pont de Nemours & Co.

Composition of matter comprising polymer containing 85% by weight acrylonitrile and malononitrile, methylene thiocyanate or cyanomethylene thiocyanate. No. 2,404,727. Ray Houtz to E. I. du Pont de Nemours & Co.

Forming clear, colorless solutions of acrylonitrile polymers which dissolve with difficulty, tend to develop color upon heating or standing, comprises mixing polymer in finely divided state with solvent containing agent to reduce solubility of polymer, etc. No. 2,404,728. Theron Finzel to E. I. du Pont de Nemours & Co.

Increasing viscosity butyl alcohol solution of formaldehyde-urea reaction product without decreasing compatibility with hydrocarbons. No. 2,404,740. John Murray and George Metzger to Libbey-Owens-Ford Glass Co.

Polymerization process for obtaining resinous material, emulsifying mixture of asymmetrical dihalogenated ethylene and alkyl ester or nitrile of alpha-methylene monocarboxylic acid, in aqueous medium having pH 1 to 5, etc. No. 2,404,779. Harold Arnold to E. I. du Pont de Nemours & Co.

Obtaining resinous material comprises polymerizing at 0° C.—80° C. polymerizable components of emulsion of vinyl chloride in admixture with polymerizable components of fumaric diester of saturated, single monohydric alcohol, etc. No. 2,404,780. Harold Arnold to E. I. du Pont de Nemours & Co.

Polymerization process for obtaining resinous material consists in emulsifying in aqueous medium mixture of vinyl halide with alkyl ester of alpha-methylene aliphatic monocarboxylic acid, employing vinyl halide in mixture, etc. No. 2,404,781. Harold Arnold, Merlin Brubaker and George Dorough to E. I. du Pont de Nemours & Co.

Contacting olefin with boron fluoride as catalyst for polymerizing, while promoting catalytic activity of boron fluoride with oxygen-containing compound of element from third series of periodic classification having atomic numbers 13 and 14. No. 2,404,788. Robert Burk and Everett Hughes to The Standard Oil Co.

Obtaining resinous material consists in emulsifying vinyl halide in aqueous medium containing vinyl halide, of dissolved salt of perdisulfuric acid, etc. No. 2,404,791. Donald Coffman and Frank McGrew to E. I. du Pont de Nemours & Co.

Polymerization process comprises emulsifying mixture of asymmetrical dichlorethylene with acrylonitrile in aqueous solution at pH, containing alkali metal salt of long chain sulfates or sulfonates and oxygen-yielding polymerization catalyst. No. 2,404,817. Daniel Strain to E. I. du Pont de Nemours & Co.

Resin product consisting of copolymer of class consisting of cyclopentadiene and dicyclopentadiene and alkyd resin consisting of unsaturated glyceride oil acid modified polyester of polyhydric alcohol and dicarboxylic acid product soluble in petroleum naphtha. No. 2,404,836. Howard Gerhart and Leon Adams to Pittsburgh Plate Glass Co.

Fusible thermosetting resin obtained by heating mixture comprising lignin and thermosetting heat reactive acid condensation product of formaldehyde and furfuryl alcohol or fusible acid condensation product of furfuryl alcohol. No. 2,404,840. Mortimer Harvey to Harvel Research Corp.

Reacting aromatic amine with shellac and aldehyde until fusible resin is formed. No. 2,404,892. Milton Scott to American Cyanamid Co.

Plastic composition comprising cellulose treated with ammoniated solution of sugar capable of reacting with urea and formaldehyde and of sulphates of copper, nickel, aluminum or zinc; the soluble form of chromic sulphate; the tri and tetra chlorides of titanium; zinc chloride; zinc dichromate; copper (cupric) formate; chromium or ferric oxalates, treated cellulose impregnated with urea-formaldehyde condensation product. No. 2,404,910. Auguste Keller to Howard Thompson.

Reducing heat shrinkage of shaped object of oriented, halogen-containing polymer of monoethylenic unsaturated compound having halogen attached to intralinear carbon. No. 2,405,008. Kenneth Berry and Julian Hill to E. I. du Pont de Nemours & Co.

Preparation organo-silicon compounds comprises reacting inorganic silicon halide with hydrocarbon while in vapor phase at 840° C., condensing reaction products, separating organic substituted silicon halide from reaction products. No. 2,405,019. George Dalin to Plax Corp.

Die unit for extrusion of small shapes of organic plastic material without crinkling or spiraling. No. 2,405,039. Raymond Jesionowski to Plax Corp.

Making hollow synthetic resin articles includes flowing thermoplastic synthetic resin about core, etc. No. 2,405,329. Clayton Ruebensaal to The Glenn L. Martin Co.

Polymerized chloroprene synthetic rubber having dispersed magnesia and carbon containing product obtained as residue from distillation of crude magnesium condensate. No. 2,405,336. Gerald von Stroh to The Permanente Metals Corp.

Re-pressing or shaping cellular thermoplastic sheets produced by expansion of gas impregnated thermoplastic material. No. 2,405,345. Alfred Cooper and Douglas Partington to Expanded Rubber Co., Ltd.

Polymerization process wherein polymerizable olefinic material is reacted at temperature below atmospheric to produce vulcanizable polymer in presence of Friedel-Crafts type catalyst as chilled stream projected into space. No. 2,405,480. Henry Wilde to Standard Oil Development Co.

Rigid structural material comprising corrugated fibrous webs, coating of

meltable, flowable bituminous composition, superimposed an adherent layer of hardened, stonelike cement composition, etc. No. 2,405,527. Max Skolnik to Fibro-Mold Specialties, Inc.

Making formed articles comprises applying layer of hardsetting plastic composition containing magnesium oxychloride cement as major binding ingredient over fibrous material impregnated with solid, high melting point bitumen composition, etc. No. 2,405,528. Max Skolnik to Fibro-Mold Specialties, Inc.

*Processes and Methods

Press for molding plastics. No. 2,403,948. Forrest Purinton to The Patent Button Co.

Determining amount of one component of mixture comprising source of radiation, means for passing radiation through mixture, means for resolving unabsorbed radiation into component wave lengths, means for scanning resolved radiation, means for selecting plurality of bands, means for converting bands into electrical energy, means for obtaining averaged value of any number of energies, means for balancing averaged value against averaged value of remaining energies. No. 2,404,064. John Heigl and James Wilson to Standard Oil Development Co.

In control apparatus, device adapted to emit radiations when heated, power connections, standard radiation source, radiation sensitive cell, adapted to produce voltages responsive to radiation intensities impressed upon it, etc. No. 2,404,147. Harold Strickland, Jr. to Edward G. Budd Manufacturing Co.

Producing shaped articles useful in industry, comprises finely comminuting bituminous coal, intimately mixing with softening agent, subjecting mixture in mold to pressure of 250 atmospheres at 256° C. No. 2,404,208. Donald Bangham, John Bennett, Robert Brown, Wallace Hirst, Marcello Pirani and George Phillpotts to C. D. Patents Ltd.

Separating solid particles of various size from liquid comprises introducing liquid containing solid into vessel having filter across bottom, agitating same, passing air up through filter, keeping particles in suspension, stopping flow of air allowing large particles to settle upon filter, causing liquid to flow through filter, etc. No. 2,404,215. Robert Cavanaugh to E. I. du Pont de Nemours & Co.

Molding apparatus, plurality of cylindrical mold elements, plurality of supports having grooves for receiving mold elements, maintaining them in coaxial alignment, mold elements being free for sliding movement relative to supports and for ready removal as a unit from supports, etc. No. 2,404,314. Howard Rogers to Polaroid Corp.

Phototube comprising tubular glass envelope, metal closure at each end of envelope, cathode foundation extending transversely of envelope, coating of antimony, arsenic, or bismuth on surface of foundation facing one of metal closures, similar coating on other of closures, alkali metal within envelope to sensitize coatings. No. 2,404,343. Joseph Henderson and Robert Janes; said Henderson to the Secretary of Navy of the U.S. of America, said Janes to Radio Corp. of America.

Process for plasticizing discrete, dry, solid particles of thermoplastic material having poor heat conductivity when in dry solid state, having increased heat conductivity when in highly heated plastic state, comprises continuously circulating stream of material in highly heated, semi-molten, plastic condition through restricted passageway at velocity sufficient to produce turbulent flow, continuously adding heat, etc. No. 2,404,406. Fred Roddy.

Molding machine including injection apparatus for ejecting plastic material including mold, injection means for forcing material into mold, fluid motor means for operating injection apparatus, fluid motor means for opening and closing mold, etc. No. 2,404,559. Bernard Ashbaugh to The Hydraulic Development Corp. Inc.

Molding process. No. 2,404,671. Leroy Vinal to E. I. du Pont de Nemours & Co.

Utilizing waste heat available at plurality of widely scattered heat sources. No. 2,404,792. David Dalin.

Method and apparatus for separating immiscible fluids. No. 2,404,872. John Walker, Jr. to Selas Corp. of America.

Activating primary carbon comprising advancing charge of material of granular form and non-uniform density through elongated activating chamber, maintaining chamber under heat conditions activation of material. No. 2,405,206. Worth Goss and Oliver Goss to William Carlisle, Sr.

*Rubber

Producing cellular hard rubber, comprising mixing with rubber composition ferrous oxalate, heating mixed composition to below 150° C., to vulcanise rubber partially, heating composition to 150° C., producing decomposition of ferrous oxalate and expansion of composition to cellular form and the completion of vulcanization. No. 2,404,171. George Hamilton to Callender's Cable & Construction Co. Ltd.

Reclamation of rubber from vulcanized rubber waste containing fibrous carbonizable materials, comprises heating rubber waste in an atmosphere of flue gases at pressure not exceeding atmospheric, at temperature about 450° to 500° F. for 1 to 2 hours. No. 2,404,293. Alexander Johnston to The North British Rubber Co. Ltd.

Manufacture of synthetic rubber by polymerization of butadiene 1.3 hydrocarbon, wherein hydrocarbon is polymerized in admixture with vinylacetylene, constituents being in emulsion form during polymerization. No. 2,404,392. Alessandro Maximoff.

Latex containing sulfur, benzothiazyl accelerator, free of zinc oxide, containing red lead oxide in amount to activate accelerator. No. 2,404,585. Ernst Schmidt to The Firestone Tire & Rubber Co.

In compounding rubber, the method comprising incorporating dehydrated resin into rubber composition while compounding composition, thereby extending volume of rubber in composition, the dehydrated resin being obtained by washing coke oven light oil with concentrated sulphuric acid, diluting the sludge reaction product with water, causing separation of resinous organic matter from acid, drawing off, neutralizing, dissolving, dehydrating neutralized resinous matter. No. 2,404,608. Joseph Wells and Philip Wilson, Jr. to Carnegie-Illinois Steel Corp.

Simultaneously forming plurality of cellular vulcanized rubber bodies of general cylindrical shape comprises charging green rubber into succession of laterally secured, axially expansible mold matrices whose end walls are confined against axial expansion, gassing, vulcanizing rubber, expanding rubber in axial direction, restraining against expansion in radial direction. No. 2,404,636. Walter Humphrey to Pennsylvania Rubber Co.

Elastic fabric comprising layer of rubber having pores, layer of fabric elastically bonded to layer of rubber, fabric having threads normally retained in relaxed condition by layer of rubber, etc. No. 2,404,758. Merwyn Teague and Paul Mahoney to United States Rubber Co.

Cell for liquid fuel, walls comprising outer ply of steer-hide, ply of unvulcanized rubber, ply fine-grained sponge rubber having non-communicating cells, second ply unvulcanized rubber, one inner ply of polymerized 2 chloro-1,3 butadiene, and protective film of acrylic resin on exposed face. No. 2,404,766. Elmo Hanson and Charles Park to The Firestone Tire & Rubber Co.

Vulcanizer. No. 2,404,989. Paul Schmid and Henry Hylton to Acme Air Appliance Co. Inc.

Elongated vulcanizing chamber containing steam under pressure, separate means for admitting articles to one end of chamber and for withdrawing articles from other end of chamber without releasing steam pressure, etc. No. 2,405,077. Elmer von der Heide.

Hollow rubber article and apparatus for producing. No. 2,405,149. David Kempthorn to The Sun Rubber Co.

Rubber hydrochloride composition containing small amount of reaction product of aliphatic aldehyde and ethylene polyamine, to stabilize rubber hydrochloride. No. 2,405,343. James Chittum and George Hulse to United States Rubber Co.

*Specialties

Fumigant composition of a volatile liquid fumigant in exploded mica. No. 2,403,435. Oscar Hammer to The Dow Chemical Co.

Additive for lubricants comprising metal derivative of reaction product of sulfide of phosphorus and organic amine. No. 2,403,474. John Bartleson and Franklin Veatch to The Standard Oil Co.

Controlling insects comprising applying 1,4-diphenylthiosemicarbazide to their habitat. No. 2,403,495. Charles Bowen to the Secretary of Agriculture of the United States of America.

Manufacturing soft impervious bodies, comprising forming viscous solution of sodium alginate into bodies of desired form, setting by immersing unsolidified bodies in solution containing glucose and calcium chloride. No. 2,403,547. William Peschardt.

Removing a greasy deposit from concrete, wood and tile surfaces which comprises applying o-dichlorbenzene containing dissolved water-soluble alkyl mononuclear aromatic sulfonate detergent, the alkyl side chain of which contains between 12 and 30 carbon atoms. No. 2,403,612. Robert Reynolds and Harlan Rice to The Solvay Process Co.

Removing greasy deposits from concrete floors which comprises applying thereto composition comprising o-dichlorbenzene containing dissolved inorganic-salt-free sulfonated detergent. No. 2,403,613. Robert Reynolds and Harlan Rice to The Solvay Process Co.

Cleaning composition for removing sludge from internal combustion engines consisting of homogenous liquid mixture of solvent composed of glycol monoalkyl ether and higher molecular weight aliphatic ketone, lubricating oil, water, morpholine soap coupling agent. No. 2,403,618. George Skinner to National Carbon Co. Inc.

Cleaning composition for removing sludge from internal combustion engines consisting of a liquid mixture of solvent composed of ethylene glycol monoethyl ether acetate and ethylene glycol monobutyl ether, a lubricating oil, water, morpholine oleate, oleic acid. No. 2,403,619. George Skinner to National Carbon Co. Inc.

Electrical insulating and dielectric medium consisting of polystyrene and distributed therethrough finely divided copper or silver. No. 2,403,657. Robert Harvey to Radio Corp. of America.

Rust preventive compounds, oil-soluble addition salts having formula described in patent. No. 2,403,762. Herschel Smith and Troy Cantrell to Gulf Oil Corp.

Rust preventive compounds, oil-soluble addition salts having formula described in patent. No. 2,403,763. Herschel Smith and Troy Cantrell to Gulf Oil Corp.

Cloth for cleaning and polishing metal surfaces comprising sheet impregnated with oleic acid, triethanolamine, magnesium oxide (light), precipitated calcium carbonate, infusorial earth. No. 2,403,821. John Morgan and Russell Lowe to Cities Service Oil Co.

Making floating soap comprises aerating molten soap employing agitation of soap while in molten state, applying pressure to molten soap with reduction in volume thereof. No. 2,403,925. Martin Ittner to Colgate-Palmolive-Peet Co.

Improved mineral oil comprises petroleum lubricating oil and to retard rusting semi-lactide of alpha hydroxy aliphatic acid. No. 2,403,928. Milton Kleinholz to Sinclair Refining Co.

Detergent comprising mixture tolyl ethyl alcohol and alkali metal soap. No. 2,404,003. Frank Soday to The United Gas Improvement Co.

Detergent composition, comprising mixture of ester of tolyl ethyl alcohol and alkali metal soap. No. 2,404,004. Frank Soday to The United Gas Improvement Co.

Printing predetermined design upon one side of transfer sheet, bringing the printed side of sheet into contact with layer of organic plastic, bringing embossing device into registration with part of printed design, forcing part printed design against plastic layer. No. 2,404,073. Edward Karfiol and William Roehm to Royal Lace Paper Works.

Detergent composition comprising sodium carbonate, tetrasodium pyrophosphate, trisodium phosphate, sodium metasilicate, water-soluble, solid organic sulfonate detergent. No. 2,404,289. William Hicks and Donald Saunders to The Solvay Process Co.

Composition having deterging and wetting properties composed of mixture of neutral higher fatty acid amide of alkylol amines, water-soluble soap in which cation is alkali metals, ammonium or substiuted ammonium bases, water-soluble organic nitrogenous base. No. 2,404,297. Harry Kroll to Alrose Chemical Co.

Eraser composition comprising approximately polyvinyl acetate, dibutyl phthalate, rosin. No. 2,404,322. Stanley Southard to Sun Chemical Corp.

Moisture-setting printing ink, comprising water-insoluble coloring matter dispersed in varnish consisting of solution of shellac in polypropylene glycol liquid at normal temperature. No. 2,404,680. Carl Aneshansel to Sterling Drug Inc.

Non-aqueous insect repellent composition of gel-like consistency free from highly volatile solvents comprising plurality of cellulose derivatives, cellulose esters or cellulose ethers, one non-volatile insect repellent solvent for cellulose derivatives separately. No. 2,404,698. Alfred Dreyling to E. I. du Pont de Nemours & Co.

Putty for planographic printing comprising color capable of being fixed on cellulose without mordanting, carbohydrate gum, amide of carbonic

* *Continued from Vol. 588, Nos. 2, 3, 4, 5, Vol. 589, No. 1.*

acid, thiocarbonic acid or cyanuric acid, etc. No. 2,404,769. Chester Amick to American Cyanamid Co.

Stirring nitrocellulose in aqueous solution containing ammonia at room temperature for 1 hour, to stabilize nitrocellulose. No. 2,404,887. Richard Reeves and Joel Giddens to the Secretary of Agriculture of the United States of America.

Polishing composition consisting of mixture of natural and N-acyl aminobiphenyl and solvent. No. 2,404,896. David Aelony to Monsanto Chemical Co.

Bonding glass fabrics to surfaces of metal, ceramic, glass, and other solid inorganic bodies, comprises forming on surface coating of vitreous material that matures at temperature as high as temperature at which fibres of the fabric fuse, etc. No. 2,404,904. Howard Collins to Owens-Corning Fiberglas Corp.

Liquid, the surface activity of which has been changed, comprising solution of alkyl naphthalene sulfonate and methyl-n-amyl ketone, diisobutyl ketone or methyl-n-butyl ketone. No. 2,404,913. Lee Leiserson to Virginia Smelting Co.

Producing luminescent composition, comprising admixing substances incorporating zinc and sulphur capable of forming luminescent zinc sulphide upon calcination, volatile salt convertible into ammonia vapor, subjecting mixture to ignition in chamber. No. 2,405,031. Mac Goodman.

Waving hair comprises treating hair simultaneously with reducing agent for keratin and with detergent. No. 2,405,166. Raymond Reed, David Tenenbaum and Marion Den Beste to Raymond Laboratories, Inc.

Mold core. No. 2,405,254. Robert Hopkins to The M. W. Kellogg Co.

Fire-extinguishing composition comprises mixing substance taken from cottonseed or peanut cakes with hydrated lime, adding water, heating until proteins converted to proteoses and peptones, filtering insoluble material, proteoses capable of becoming hardened when subjected to high temperatures. No. 2,405,438. David Levin to Chemical Concentrates Corp.

Air treating apparatus comprising tank adapted to contain liquid, pipe extending downwardly into tank providing inlet for air, outlet apertures in top wall of tank, etc. No. 2,405,494. Charles Depuy to O-Cedar Corp.

Stencil for electro-etching metal surfaces, comprising carrier web coated with acid resistant dielectric film, etc. No. 2,405,508. Allen Lindsay.

Abrasive article comprising layers of abrasive-included felted, fibrous sheet material, being adhesively combined by means of adhesive binder comprising phenolic resin. No. 2,405,524. Donald Sharpe and Richard Baumgartner to The Carborundum Co.

Composition of matter, foam generator powder mixture containing in combination with dry foam-generating reagents, stabilizer, and fine-textured particles of water-insoluble substance from carboxylated, saturated long-chain aliphatic hydrocarbons. No. 2,405,538. Clifford White to American-La France-Foamite Corp.

*Textiles

Manufacture of artificial wool imitation filaments and the like, comprising making ageing, xanthating and dissolving alkali-cellulose into viscose, storing said viscose to give an ordinary ripeness, and viscosity of at least 500 and spinning viscose into bath containing 11% sulphuric acid, 22% sodium sulphide, 4% zinc sulphate to form filaments. No. 2,403,437. Heinz-Horst Von Kohorn Zu Kornegg, by judicial change of name Henry Von Kohorn.

Composition of matter adapted to warp sizing of rayon yarn and the like comprising aqueous-dispersion of film-forming substance, and wetting agents for yarn and as plasticizers for film that is formed on yarn, wherein xylan is film-forming substance. No. 2,403,515. Allen Fuller to A. E. Staley Manufacturing Co.

Producing yarn packages having transfer tail. No. 2,403,908. Theodore Carlson to Celanese Corp. of America.

Fibrous material rendered resistant to mildew by presence therein of water-insoluble ortho hydroxy diphenyl compound containing acyl group. No. 2,403,945. David Musser to Pacific Mills.

Reducing tendency of filaments, articles comprising resinous polymerization product of vinyl halide to accumulate charges of static electricity, comprises applying to surface of article liquid composition containing anti-static component, water-dispersible compound having polyalkylene polyamine nucleus, having average molecular weight at least 300. No. 2,403,960. Willia Stoops and Alexander Wilson to Carbide & Carbon Chemicals Corp.

Thread conditioning composition comprises low viscosity mineral oil and sorbitan trioleate. No. 2,404,240. Robert MacLaurin to Industrial Rayon Corp.

Coated fabric suitable for manufacture of raincoats comprising fabric having following approximate composition adhered to one side, copolymer of vinyl chloride and vinyl acetate in ratio of 90 parts vinyl chloride, 10 parts vinyl acetate, azelaic di-ester of monobutyl ether of ethylene glycol, pigments, stabilizer for vinyl resin. No. 2,404,313. Ernest Rodman to E. I. du Pont de Nemours & Co.

Increasing strength of artificial fibers made from casein, comprises dry-spinning artificial fibers from alkaline casein mass, hardening dry fibers while in alkaline condition with gaseous formaldehyde, freeing fibers of alkali with dilute acid, stretching fibers while wet, treating fibers with chromium salt solution, washing, drying fibers. No. 2,404,665. Rudolf Signer.

Treating open weave cotton fabric with agent which swells cellulose, tending to shrink fabric, removing cellulose-swelling agent, drying fabric, maintaining it under tension in one direction no tension in direction normal thereto, yarns of fabric running in non-tensioned direction are crimped yarns running in tensioned direction are on-crimped, imparting elasticity to fabric in non-tensioned direction. No. 2,404,837. Charles Goldthwait to the Secretary of Agriculture of the United States of America.

Device for treating wound cakes of filamentary material comprising longitudinal member, single socketed element mounted for rotation about member, portable carrier for cakes consisting of straight rod. No. 2,405,520. Arthur Richardson and Donald Thompson to American Viscose Corp.

*Water, Sewage and Sanitation

Purifying water, comprises passing water containing less than 20 P. P.M. of total solids through hydrogen zeolite, then through an anion active material treated with reagent, aqueous solution of carbonate and bicarbonate, having pH of 7.5. No. 2,404,367. Walter Durant and William Blann to American Cyanamid Co.

Portable water purification and filtration unit. No. 2,404,967. Jerome Levy to Titeflex, Inc.

Softening water by adding potassium Kurrol salt and salt of ammonium; softening water with potassium Kurrol salt and Maddrell salt; water softening composition comprising water-insoluble potassium metaphosphate in aqueous solution of sodium nitrate, and other compositions. No. 2,405,276. Ambrose Taylor to Calgon, Inc.

In water softener a softener tank, source of regenerating solution, conduits connected with tank for introducing raw water, introducing regenerating solution, carrying away treated water, etc. No. 2,405,479. Fred Whitlock to Automatic Pump & Softener Corp.

Agricultural

Insecticidal composition comprising compound of the general formula described in patent. No. 2,405,743. Samuel Gertler to the Secretary of Agriculture of the United States of America.

Process for treatment of areas infested with fungus and insects, comprises spraying areas with material comprising a pure isoparaffinic oil boiling at 350° F. to 800° F. No. 2,405,775. William Bradley to Union Oil Co. of California.

Insecticidal composition containing active toxic ingredient cyclopropyl furyl propenone. No. 2,406,294. James Hansen and Carroll Cassil to California Spray-Chemical Corp.

Insecticide of stomach poison type consisting of aqueous dispersion of crude vegetable oil phosphatide and stomach poison. No. 2,407,041. Benjamin Thurman to Benjamin Clayton, as Refining, Unincorp.

Repelling insects by applying to insect repellent comprising 2-ethylhexanediol-1,3. No. 2,407,205. Benjamin Wilkes to Carbide & Carbon Chemicals Corp.

Destruction by fumigation of micro-organisms, with lethal concentration in air of 2-bromo-2-methyl propane or 2-iodo-2-methyl propane. No. 2,407,333. Peter Wenck and Walter Henson to The Dow Chemical Co.

Biochemical

Obtaining anti-bacterial substance cultivation of strains of Bacillus brevis, in aqueous medium containing source of nitrogen selected from beta-alanine, dl-phenyl alanine, dl-aspartic acid, glycine, etc. No. 2,406,174. Jacob Stokes to Merck & Co. Inc.

Preparing aqueous suspension of comminuted fish viscera at pH 1.5, adding pepsin, oil separates, removing acid liquid, recovering vitamin B-containing aqueous solution from liquid. No. 2,406,249. Ivan Parfentjev.

Preparing from growing leguminous plant material pectase extract comprises mechanically disintegrating vegetable material, steeping with water, separating vegetable material from green aqueous pectase extract, incorporating with extract calcium carbonate and aluminum salt, separating precipitate. No. 2,406,840. Herbert Leo and Clarence Taylor.

Bactericidal-and-illuminating lamp comprising ultra-violet positive-column-discharge lamp containing mercury vapor. No. 2,407,379. Walter Morehouse.

Cellulose

Dyeing fabrics containing organic derivative of cellulose yarns, comprises immersing fabric in heated bath containing dyestuff, withdrawing fabric from bath, maintaining fabric at same temperature as heated dye bath while out of bath until dyeing is completed. No. 2,405,669. Herbert Platt and Cyril Croft to Celanese Corp. of America.

Compositions comprising organic solvent-soluble allyl ethers of carbohydrates selected from ethers of starch and ethers of cellulose. No. 2,406,369. Robert Hamilton and Peter Nichols, Jr., to the Secretary of Agriculture of the United States of America.

Rendering staple fibers having basis of organic derivative of cellulose more amenable to textile operations by applying conditioning agent comprising reaction product of mixture of long chain higher fatty acid, vegetable oil and mineral oil with oleum, having added penetrating agent and neutralized with alkali and hydroxyalkyl amine. No. 2,406,407. Fred Schiessler to Celanese Corp. of America.

Production of staple fiber textile materials, having basis of filaments of organic derivative of cellulose, of improved textile processing characteristics, comprises applying to mineral oil lubricated, continuous filament textile material non-aqueous conditioning agent. No. 2,406,542. Harmon Howorth and Laurence Holt to Celanese Corp. of America.

Passing flexible regenerated cellulose pellicle in highly swollen condition through aqueous bath containing synthetic linear polymer having molecular weight above 400. No. 2,406,905. Henry Rothrock to E. I. du Pont de Nemours & Co.

Yarn comprising organic ester of cellulose having applied lubricating fluid comprising mineral oil, sulfonated oil, animal oil lubricant, hydroxyalkyl amine salt of long chain fatty acid blending agent. No. 2,407,105. George Seymour and Walter Brooks to Celanese Corp. of America.

Making shallow plates of cellulose material. No. 2,407,118. Harry Waters.

Ceramics

Optical glasses having constituents, silica, barium oxide, boron oxide, lanthanum oxide, thorium oxide, zinc oxide. No. 2,406,580. Raymond Bastick and Ta-Hang Wang to Chance Brothers Ltd.

Laminated glass glazing unit. No. 2,406,939. James Boicey to Libbey-Owens-Ford Glass Co.

Producing sheet or tile for use wall surface, comprising combining magnesite, clay, silica, chalk and Baume magnesium chloride water solution, providing mineral binder, wood excelsior. No. 2,407,025. Daniel Luse.

Glass fiber forming apparatus. No. 2,407,295. Allen Simison and Ed Fletcher to Owens-Corning Fiberglas Corp.

Producing fibrous glass. No. 2,407,456. Allen Simison and Ed Fletcher to Owens-Corning Fiberglas Corp.

Treating fabricated textile material composed of interwoven yarns of fine glass fibers comprises reducing diameter of individual fibers throughout textile by subjecting fibers to solution of inorganic alkali. No. 2,407,483. Paul Ebaugh to Owens-Corning Fiberglas Corp.

* *Continued from Vol. 588, Nos. 2, 3, 4, 5, Vol. 589, No. 1.*

Coatings

Obtaining metal article having hard, adherent coating comprises applying to metal surface film, of polymer of ethylene, baking coated metal in contact with oxygen containing gas until film becomes insoluble in solvent for untreated polymer. No. 2,406,039. Milton Roedel to E. I. du Pont de Nemours & Co.

In coating apparatus combination of means for supplying to pond coating material in film evenly distributed throughout width of one roll, means for varying thickness of film in response to changes in level of pond. No. 2,406,470. William Maxim and Edward Hutchins to International Paper Co.

Liquid coating composition comprising cellulose acetate, toluene sulfonamide-formaldehyde resin, triphenyl phosphate, and acetanilide dissolved in solvent mixture of acetone, ethyl alcohol, ethyl lactate and triethyl citrate. No. 2,406,649. George Witty.

Smoothing thermoplastic coating material applied to surface of sheet or web, comprising plurality of spaced bars having smooth curved surfaces for contacting coating material, means for heating surfaces, etc. No. 2,407,335. Arthur Wickwire, Jr., to Interchemical Corp.

Dyestuffs

Manufacture of o:o'-dihydroxy azo dyestuffs comprises coupling diazotised 6-nitro-2-amino-4-amplyphenol with pyrazolone sulfonic acid. No. 2,405,816. Achille Conzetti to J. R. Geigy A. G.

Acid disazo dyestuff having in free state formula described in patent. No. 2,405,835. Adolf Krebser to J. R. Geigy A. G.

Brightly-colored compound having formula: $OH.C_{10}H_6.CH:N.R.N:CH.C_{10}H_6OH$ where R is methylene di (p-phenylene) in which $OH-C_{10}H_6-$ is alpha-(2-hydroxy naphthyl). No. 2,405,886. Albert Hardman to Wingfoot Corp.

Azo compounds having the formula described in patent. No. 2,406,004. Joseph Dickey and James McNally to Eastman Kodak Co.

Coloration of textile materials comprises applying salt of acid sulfuric acid ester of leuco compound of vat dyestuff together with caffeine, developing dyestuff by oxidation on material in acid medium. No. 2,406,586. Earl Clark to Allied Chemical & Dye Corp.

New coloring matters, formula described in patent. No. 2,407,346. Maurice Rogers to Imperial Chemical Industries Ltd.

Equipment

Filtering apparatus including walled body having filtering sand in bottom, spill-over wall in bottom of body confining said at one side, spaced from wall body to provide waste channel. No. 22,784. William Smalley to The Paterson Engineering Co., Ltd.

Countercurrent process for extracting liquid mixture of hydrocarbons wherein raffinate phase flows in contact with and countercurrently to extract phase, maintaining gradual temperature drop within mixture of two flowing phases. No. 22,788. Willem van Dijck to Shell Development Co.

In conveyer, endless conveying element to be drawn through endless casing, comprising series of flight units, having main body portion, reinforcing rib of sheet metal fastened edgewise to face of main body and having end portion alinement with one side edge of main body portion, etc. No. 22,789. Eugene Brunner to Read Machinery Co., Inc.

Pipe comprising surrounding thick wall of asbestos cementitious composition, thin metallic lining extending throughout length of wall, etc. No. 2,405,567. John Ferla to U. S. Asbestos Cement Pipe Co.

Geiger-Mueller tube for comparing hard radiation of unknown intensity with hard radiation of known intensity comprising, radiation-permeable tubular member forming cathode, anode extending axially therethrough, etc. No. 2,405,572. Herbert Friedman.

Vapor generator comprising tubular means forming fluid flow path, circulating means for delivering fluid to path under pressure, means for heating fluid for conversion to vapor, pump for delivering fluid to circulating means, driving means for circulating means actuated by fluid discharged by pump, discharge of driving means connected to intake of pump. No. 2,405,573. Martin Frisch to Foster Wheeler Corp.

Predetermining dispensing apparatus, fluid flow responsive device operable by flow of fluid in either direction. No. 2,405,589. Walter Marsh and Einar Thoresen to Pittsburgh Equitable Meter Co.

Packing for vapor and liquid contacting apparatus. No. 2,405,593. Francis Melvill.

Pressure equalizing device comprising enclosed compartment, aperture through wall of compartment, flat annular frame about aperture outside wall, perforated grill across aperture, flexible sack, within compartment, etc. No. 2,405,614. Morris Shriro to the Secretary of War of the United States of America.

Separating suspended particles from air comprises centrifugal separator, Venturi passage comprising throat and expanding passage leading from throat to centrifugal separator, draw off passages from expanding passage transverse to direction of flow. No. 2,405,624. John Watson and Louis Whiton and Charles McBride to Prat-Daniel Corp.

Dust separating apparatus comprises elongated chamber having inlet, outlet, disc filter, motor driven fan, bag filter secured to chamber, etc. No. 2,405,625. Louis Whiton and John Watson and Charles McBride.

Control apparatus for moving load in desired direction to desired end position, drive means including motor for moving load, means including selectively adjusted member for controlling drive means to rotate motor in direction to cause operational movement of load in desired direction, to stop drive means with load in end position. No. 2,405,629. Michel Yardeny.

Drying oven using infra-red lamps for drying coating of articles, means for arranging plurality of infra-red lamps in line approximating contour of article being dried. No. 2,405,631. Charles Attwood.

Grinding mill discharge means comprising members defining channel in communication with grinding chamber of mill, resilient elements defining slot at base of channel, backing means for resilient elements. No. 2,405,633. Lyle Barker and Evan Lewis to Phelps Dodge Corp.

Apparatus for injecting foam-forming material into flowing stream of water comprising tank having pair of independent chambers adapted to contain separate supplies of foam-forming material, tank having opening common to chambers disposed to provide direct access to each chamber, etc. No. 2, 405,652. Francis Hogenmiller, Fisher Boyd and Lewis Boerner to National Foam System, Inc.

Welding rod of substantially austenitic iron-chromium-nickel alloy containing chromium, nickel, manganese, vanadium, carbon, fluxing materials, iron and incidental impurities. No. 2,405,666. Stanley Norwood to Electro Metallurgical Co.

In electric welding, improvement consists in applying only to electrode heat, in addition to heat from electric melting current, in amount to increase ratio of melted electrode metal to metal workpiece metal. No. 2,405,673. Egon Scherl to The Linde Air Products Co.

Drum valve and faucet. No. 2,405,681. Walter Woock.

Grinding mill. No. 2,405,692. John Hall to International Harvester Co.

Dump car construction. No. 2,405,696. Fred Hoelzgen.

Oil well pump comprising: barrel, plunger reciprocable therein, valve on plunger for regulating out flow of oil from well, means for injecting desanding fluid through valve to points in barrel below valve. No. 2,405,697. Howard Houston and John Humphrey.

Filter panel comprising frame having four sides, open at front and rear faces, adapted to fit in duct, sheet of filter material near one face folded in zig-zag folds, etc. No. 2,405,716. Oliver Schaaf to Air-Maze Corp.

Heat exchange duct structure comprising elongated tubular body for separating two fluids for exchange of heat between them. No. 2,405,722. Charles Villier.

Producing annular compressed wire mesh units. No. 2,405,725. Otto York to Metal Textile Corp.

Pump having chamber and diaphragm within chamber, dividing into impelling liquid compartment and pumping compartment, inlet and outlet valves permitting inflow and outflow of liquid from pumping compartment upon movement of diaphragm, etc. No. 2,405,734. Harrison Coe.

Non-spill vent plug for container of liquid which evolves gas. No. 2,405,736. Robert Daily and Louis Crooks to General Motors Corp.

Combined air hydraulic pressure actuating system. No. 2,405,759. Steve Schnell to Wagner Electric Corp.

Electromagnetic vibrator. No. 2,405,761. Walter Stewart Simmie.

Electric thermal switch. No. 2,405,767. Earl Sprague to Raymond Scheffler.

Axial flow blower. No. 2,405,768. Edward Stalker.

Portable derrick. No. 2,405,794. Glenn Loomis.

In air conditioning, cooling body of air with result that vapor is condensed and low vapor-pressure zone is created, passing air along adjacent zone, independently washing and cleaning air before it passes zone. No. 2,405,812. Thomas Binder.

Drying system for drying coated tape and the like, comprising housing containing plurality of infra-red lamps, means for passing tape past lamps. No. 2,405,813. Charles Blanchard to B. F. Sturtevant Co.

Sealed flexible coupling for thin walled tube. No. 2,405,822. George Franck to The Imperial Brass Manufacturing Co.

Container having fibrous laminated body with open end, compressible gasket of twisted fibrous material fastened by stitching to outer wall. No. 2,405,823. Paul Gaylord to Greif Bros. Cooperage Corp.

Apparatus for arc welding. No. 2,405,828. William Huguley.

Combined pressure and temperature controlled valve for controlling flow of viscous fluid through bypass port of heat exchanger. No. 2,405,831. Raymond Jensen to The Garrett Corp., Airesearch Manufacturing Co. Div.

Self-priming pump. No. 2,405,836. Harry La Bour.

Apparatus for separating constituents of liquid mixture, of different specific gravities, comprising closed housing having mixture intake means, series of spaced concentric, liquid-pervious, foraminous body masses extending perpendicularly within housing adapted to subdivide housing, whereby liquid mixture entering housing may pass laterally through foraminous body mass; each foraminous body mass comprising superposed layers of knitted metallic mesh to exercise capillary effect upon constituent of liquid mixture of lesser specific gravity. No. 2,405,838. Archibald Lawson and Charles Young.

Lift truck. No. 2,405,848. George Quayle to The Yale & Towne Manufacturing Co.

Fluid carrying, transferring, and shutoff device. No. 2,405,864. Lloyd Vizay to L. W. Vizay Corp.

Thermostatic switch comprising pair of rigid L-shaped carrier arms swingable about spaced pivots having corresponding ends with surfaces spaced apart, on one side of pivots, cooperating contacts carried by opposite corresponding ends of arms, compression spring coacting with surfaces urging contacts toward each other through arms, U-shaped thermostatic element between arms acting in opposition to spring. No. 2,405,869. Alfred Wild.

Valve testing machine. No. 2,405,924. William Marshall, Jr. to Crane Co.

Deviation recording device shaped to be lowered into well including casing having upper and lower sections and inside coupling connecting sections, having means in lower section effective to make record of inclination of well bore, etc. No. 2,405,937. Albert Beal.

Multiple injection pump. No. 2,405,938. Louis Beeh.

Selector cock. No. 2,405,940. Otto Burkhardt.

In direct expansion chiller, shell comprising longitudinal tubular wall and spaced tube sheets, being evaporator of refrigeration system, etc. No. 2,405,944. Eugene Edmonds to Henry Vogt Machine Co., Inc.

In mechanical concentrating device, combination of concentrating compartment, discharge means for evacuating concentrates from compartment, gate mechanism for discharge means comprising plurality of elements, etc. No. 2,405,976. Charles Patterson to The McNally-Pittsburg Manufacturing Corp.

In liquefied gas dispensing system pressure storage tank receiving heat from outside source, means for withdrawing liquid from tank, pressure regulator connected to means to receive liquid having portion disposed in heat exchange contact with liquefied gas in tank. No. 2,405,998. William Buttner and Savin Sundstrom to The Bastian Blessing Co.

Vacuum pump adapted to evacuate closed system comprising in combination closed chamber, liquid jet nozzle, directed toward opposite end of chamber, inlet for gases to be entrained or pumped, means for guiding vapors given off by liquid jet, collecting and separating means for liquid and entrained gases, means for compressing and heating actuating liquid, means for conveying compressed and heated liquid to nozzle for reuse, exhaust port for removing entrained gases. No. 2,406,017. Kenneth Hickman to Distillation Products, Inc.

In continuous rotary disk filter comprising casing, horizontal rotatable shaft, plurality of filter sectors, interconnected slurry tanks for disks, filter cake discharge means between adjacent slurry tanks, deflector blades for deflecting filter cake from disks. No. 2,406,065. John Dickinson and Arthur Moorman to Standard Oil Co.

In combination, rotor comprising shaft haying axial passageway, outlet in shaft, passageway extending from outlet inwardly into communication with axial passageway, cylinder mounted on shaft extending transversely of axis of rotation of shaft, inlet into cylinder, communication between cylinder and axial passageway in shaft, valve controlling inlet, piston for reciprocation in cylinder carrying valve, etc. No. 2,406,087. Marion Mallory.

Auxiliary eyeshield and welding hood. No. 2,406,092. Roger Meyer.

Valve assembly comprising valve casing having passageway therethrough for fluid, controlling assembly in casing embodying sleeve valve transversely expansible, at one end, having transverse bore, at other end, expander in expansible end of valve having external socket, etc. No. 2,406,099. Arthur Penick.

Gas flow resistance, comprising glass tube, metal rod in bore of tube providing gas flow resistance space between wall of tube and wall of metal rod, size of space determined by difference of contraction between two materials when cooled from heated state. No. 2,406,141. George Fredericks to George E. Fredericks Co.

Metallurgical vessel having two duplicate discharge openings, heating electrode in vessel, means for rotating vessel to bring either one of openings into pouring position below electrode while moving other opening out of pouring positin. N. 2,406,147. Robert Hopkins to The M. W. Kellogg Co.

Instrument for evaluating photoelectrically light reflected from surface, support having outer face for providing plane to dispose surface, support having aperture opening inwardly from face, light source, collimator to direct light from source within area of aperture, etc. No. 2,406,166. William Scott to E. I. du Pont de Nemours & Co.

Ventilating unit comprising base provided with opening forming ventilator throat, ventilator cap supported above ventilator throat providing lateral air exhaust openings between it and ventilator base, opposed dampers, etc. No. 2,406,168. Lucky Shumaker to H. H. Robertson Co.

In air cleaner of centrifugal type, tube through which air is exhausted upwardly, lower end of tube flared back 180 degrees, etc. No. 2,406,177. Cecil Vokes and Edward Stokes; said Stokes to Vokes Ltd.

Relief valve device automatically operated by predetermined rise in fluid pressure. No. 2,406,178. Herbert Walley, Jr.

Method of continuously indicating percentage of gas in liquid-gas mixture comprises preparing calibration chart of positive displacement pump driven at constant speed and discharging through constant resistance, in which pump discharge pressures are plotted against pump inlet pressures for liquids containing various known percentages of entrained gas, obtaining series of characteristic curves. No. 2,406,179. Bruce Walsh and George Peterson to Wright Aeronautical Corp.

Pneumodynamic extractor comprising housing volute in cross section formed with liquid discharge channel in lower portion communicating with tangential discharge opening, cylindrical basket rotatably mounted in housing, having perforated side walls permitting passage of fluids and solid bottom wall, plurality of substantially radially arranged and spirally shaped impeller ribs on outer surface of bottom wall to cooperate with volute housing to centrifugally pump liquid toward channel, through discharge opening when basket is rotated. No. 2,406,187. Patrick Bayless.

Apparatus for obtaining samples of flowing stream of fluid, main flow line for stream, cylinder, piston reciprocable within cylinder, means including valve for alternatively conveying fluid from main flow line into each end of cylinder, fluid sampler line connected to end of cylinder. No. 2,406,192. Cyrus Cantrell, Jr., to Phillips Petroleum Co.

Apparatus for automatically controlling viscosity of liquid subjected to varying temperature changes. No. 2,406,203. Harold Cruzan and Edward Warrick to United Aircrafts Products, Inc.

Purifying compressed air and draining liquid separated therefrom. No. 2,406,214. Georges Garnier to Air-Equipment.

Fluid compressor. No. 2,406,229. William Leinweber.

Liquid metering and distributing apparatus. No. 2,406,239. Henri Morgenroth.

Liquid metering and distributing apparatus. No. 2,406,240. Henri Morgenroth.

Plug type valve. No. 2,406,243. Norman Newton and Richard Fennema.

Valve, case forming chamber, ports entering chamber, piston for closing ports, rocker arm connected to piston and to plunger of solenoid, having ports to equalize pressure, etc. No. 2,406,246. Hubert Ogden.

Liquid solids separation apparatus. No. 2,406,248. Edwin Packard.

In air cleaner built up from vertically aligned nested cups, bottom cup adapted to receive dust, dry cleaner cup closing top of bottom cup, having dust discharge apertures associated with dust directing vanes, etc. No. 2,406,278. Thomas Worth.

In filter, cylindrical casing having central axis and closed lower end, header closing upper end of casing, header having internal wall means defining chamber, an inlet and an outlet in header, partition in casing forming first and second compartments, coarse filtering element in first compartment, etc. No. 2,406,308. Cecil Vokes and Edward Stokes; said Stokes to Vokes Ltd.

Apparatus for analyzing combustion processes by means of radiation characteristics. No. 2,406,318. Porter Brace to Westinghouse Electric Corp.

Gas mask canister. No. 2,406,368. William Gross.

Apparatus for fractionally distilling composite liquids comprising fractionating column having inlet, vapor and liquid contacting means in column comprising packing of capillary material through which vapor of liquid flows counter-current to reflux, etc. No. 2,406,375. William Hoyte to Foster Wheeler Corp.

Device for indicating amounts of foreign particles floating in air, small portable cabinet having continuous air passage, sinuous for forming dark intermediate portion, source of light, fan, light meter at one side of intermediate portion, light passage extending outwardly from intermediate portion for conducting light reflected from particles onto meter. No. 2,406,409. Hiram Sheridan.

Multiple stage still comprising generally cylindrical inclined tube having plurality of walls extending from bottom of tube perpendicular to axis, walls of height to provide plurality of adjacent shallow film pool areas for containing distilland, each successive pool higher than predecessor. No. 2,406,421. Herbert Wollner, John Matchett and Joseph Levine.

Apparatus in which casing with outlet opening and rotatably-mounted shaft in front of opening, centrifugal separator wheel carried by shaft having central opening communicating with outlet opening, etc. No. 2,406,441. Claude Schneible.

Thermostatic switch. No. 2,406,443. Frederick Stein.

Yoke construction for selector cocks. No. 2,406,483. John Van Epps to Thompson Products, Inc.

Pump comprising hose stretched beyond normal length, plurality of members operable one after another to keep hose stretched, and compress it for pumping. No. 2,406,485. Harold Arnold to The University of Tennessee Research Corp.

Combination of storage tank with gauge opening, vapor line through which vapors or gases can escape from or return to tank, liquid-sealed structure comprising adjustable means adapted to be arranged in one position, etc. No. 2,406,521. John Wiggins.

In mixing apparatus, support, flexible mixing receptacle, reciprocating mixing element arranged to engage end of receptacle exteriorly, remixing element arranged to engage opposed sides of receptacle exteriorly reciprocating crosshead on which end engaging mixing element is pivotally mounted for swinging movement, etc. No. 2,406,535. Donald Foote to Remington Arms Co., Inc.

Reducing evaporation losses in closed storage equipment containing relatively volatile liquids comprises heating closed vapor space above maximum temperature to which equipment is exposed, exposing the system to temperatures of atmosphere, passing into vapor space steam. No. 2,406,540. Paul Harrington to Standard Oil Development Co.

Valve cap. No. 2,406,563. Wesley Roberts.

Mechanical lubricator, base having chamber receiving oil from outside lubricator, pumping piston slidingly engaging walls of chamber projecting exteriorly, piston and walls having minute clearance for leakage of oil, housing over exteriorly projecting piston secured to housing in operative relation with piston, etc. No. 2,406,599. Bengt Folke to Nathan Manufacturing Co.

Mechanism for pressure discharge of streams of liquid. No. 2,406,659. Malcolm Boyce.

Valve mechanism comprising pair of scooplike clappers mounted on edge faces for rocking movement relative to each other about fulcrums formed adjacent larger ends of clappers, etc. No. 2,406,662. Paul Burchett.

Rapid desiccation in hermetically sealed duct system connected to free air pressure reducing means. No. 2,406,682. Norman Hayes and William Humes to National Research Corp.

Welding machine. No. 2,406,694. Raymond Kieffer to Columbus McKinnon Chain Corp.

Direct reading densitometer, light source, vacuum photo-tube, thermionic amplifier tube and means for supplying plate voltage, meter having uniformly graduated scale of density values responsively connected with plate output of thermionic amplifier tube. No. 2,406,716. Monroe Sweet to General Aniline & Film Corp.

Vibrator pivoted for vibration and having flattened portion, looped hair spring embracing flattened portion in position to engage flattened portion resiliently to resist rotation of vibrator, means to impose tension spring. No. 2,406,730. Richard Whitehead.

Suction cleaner having initial dirt separator, suction-creating means, fan and motor connected thereto, final dirt separator, dirt-removing unit. No. 2,406,733. Louis Acheson to The Hoover Co.

Control system for fuel burners having main and pilot burners comprising electrically operable control means. No. 2,406,752. Samuel Eskin and Charles Strobel to Robertshaw Thermostat Co.

Poppet valve for controlling flow of a fluid under pressure. No. 2,406,914. Carl Sievers to Phillips Petroleum Co.

High-pressure fluid pump gasketing. No. 2,406,927. Warner Tabb to Eisemann Corp.

Air cleaning device, comprising housing having inlet for dirt-laden air and outlet for cleaned air adapted to be connected to source of suction, plurality of spaced filters for removing dirt from air, movably mounted filter cleaning nozzle, etc. No. 2,406,931. Charles Troxler to The Hoover Co.

Barrel Storage rack. No. 2,406,937. William Zabriskie to Gabriel Steel Co.

Combination valve structure. No. 2,406,941. John Brooks to Howard Foundry Co.

In centrifugal pump, housing, pump shaft, impeller on shaft, axial thrust bearings carried by housing engaging forward and rear faces of impeller, cylindrical wear rings carried by impeller, complementary wear rings secured to housing for sealing impeller against leakage of fluid. No. 2,406,947. Anatol Harlamoff to A. O. Smith Corp.

Rotary pump. No. 2,406,959. Dwight Millard.

Valve seat insert assembly, assembly method and means. No. 2,406,963. Samuel Norton to Thompson Products, Inc.

Variable delivery and reversing pump. No. 2,406,964. Donald Orr.

Variable delivery fluid handling device. No. 2,406,965. Donald Orr.

Atomizer. No. 2,406,997. Harold Curry.

Anticorrosion plug. No. 2,407,023. Harry Lockwood to Chandler-Evans Corp.

Filter comprising casing, hollow cylindrical filter element, cage of resilient material surrounding element having scraper blades struck inwardly from surface, etc. No. 2,407,046. Cecil Vokes.

System for regulating adjustable flow control valve. No. 2,407,139. William Clothier and John Dunning to the Minister of Supply of the United Kingdom of Great Britain and Northern Ireland.

Solenoid valve. No. 2,407,184. Hubert Sparrow to Minneapolis-Honeywell Regulator Co.

Filter for fluid flow systems. No. 2,407,190. William Tait to Sperry Gyroscope Co., Inc.

In fluid seat, self-contained unit comprising flexible rubber sleeve of annular formation adapted to surround shaft having intermediate bulged portion to permit axial expansion and contraction, spaced resilient integral flanges on sleeve, expanding spring within sleeve, etc. No. 2,407,218. Kurt Beier to Schwitzer-Cummins Co.

In air distributing unit, tube providing air discharge outlet, plurality of plates extending transversely of tube and dividing outlet into plurality of separated openings, etc. No. 2,407,284. Walter Kennedy to Barber-Colman Co.

In device wherein rotatable shaft extends through partition and there is pressure difference in fluid on opposite sides of partition, shaft seal for preventing leakage of fluid along shaft, etc. No. 2,407,285. Jesse King.

In slurry thickener, filter plate having recesses on lower side, means for removing filtrate from recesses, filter medium under recesses constituting filtrate conduit means, and slurry flow directing plate, etc. No. 2,407,303. Harold Teale to Filter Media Corp.

Hydraulic pump for delivering pressure fluid at predetermined pressure. No. 2,407,343. Kenneth Pyne and Clifford Pyne and David Leadbeater.

Apparatus for conveying material, vibratory conveyor, and continuously operated interrupter means to deliver series of separate quantities of material. No. 2,407,357. Carl Weyandt.

Temperature measuring system. No. 2,407,361. John Wilson to Minneapolis-Honeywell Regulator Co.

Flame hardening torch. No. 2,407,370. Howard Hughey to Air Reduction Co., Inc.

Tiltable trap chamber measuring dispensing device. No. 2,407,377. Max Meyer.

Drive for triplex pumps. No. 2,407,392. Albert Ashton to Emsco Derrick & Equipment Co.

Shaker conveyor. No. 2,407,407. Herman Eberle to Goodman Manufacturing Co.

Control for use with main burner, pilot burner, main control device including power element, electrical means operated through main control to supply fuel to main burner, flame-responsive switch operated by combustion at pilot burner, etc. No. 2,407,438. Eric Newman to Automatic Control Corp.

Tare weight compensating apparatus for weighing scales. No. 2,407,513. Richard Pounds to The Exact Weight Scale Co.

Induction heater. No. 2,407,562. Einar Lofgren.

Car dumper comprising rotatably mounted cage having ring rails at ends, approach track leading to cage, receiving track leading from cage, wheels supporting cage by means of ring rails, means for driving one wheel to rotate cage and retarder for checking momentum of cage, etc. No. 2,407,569. Glenn Meritt to The Mining Safety Device Co.

Apparatus for testing compressible hardness of resilient sheet material under tension. No. 2,407,583. Edward Sprigg to The B. F. Goodrich Co.

Explosives

Detonation shield comprising outer plate, backing plate, first intermediate plate, second intermediate plate, layer of dissipative granular material between outer and first intermediate plate, layer of springs between two intermediate plates, second layer of dissipative granular material between second intermediate plate and backing plate. No. 2,405,590. Warren Mason to Bell Telephone Laboratories, Inc.

Explosive containing perchlorate of basic nitrogenous compound of ethylenic hydrocarbon. No. 2,406,572. Walter Vogl to Ralph Svoboda.

Explosive containing ethylene diamine, one amino group linked to perchloric acid, the second amino group combined with polynitroaromatic body of acid character. No. 2,406,573. Walter Vogl to Ralph Svoboda.

Preventing caking of explosive compositions containing ammonium nitrate, comprises coating ammonium nitrate particles with finely divided difficulty soluble inorganic silicates or precipitated silica. No. 2,407,151. Richard Glogau to E. I. du Pont de Nemours & Co.

Separation of blasting circuit leads. No. 2,407,442. Josephus Parr to Olive Petty.

In container for explosive shells having cylindrical case closed at one end, fibrous laminated disk, shell on disk, closely fitting walls of case, second laminated disk on top of shell, improvement consists in that disks consists of four transverse plies of felted fibers, cellulose and animal fibers. No. 2,407,500. Harold Krasner and Bertha Klausner.

Manufacture of explosive comprises forming solution mixture of dissolved solid crystalline polynitric ester and nitro cellulose, etc. No. 2,407,595. Vernon Williams and Harold Wright to Imperial Chemical Industries, Ltd.

Blasting unit and short-circuiting device. No. 2,407,605. John Hammond and Dennis Keenan; said Keenan to said Hammond.

Food

Producing white peanut meal protein comprising forming suspension in water of peanut meal and accompanying testa which remain after extraction of oil from peanut kernel, adjusting suspension to pH of 6.8 to 7.2, separating protein-containing aqueous extract from insoluble residue, adjusting pH of aqueous extract to 5.9 to 6.1 to precipitate desired protein. No. 2,405,830. George Irving, Jr., Arthur Merrifield, Raymond Burnett and Edwin Parker to the Secretary of Agriculture of the United States of America.

Making whippable cream substitute, comprising preparing aqueous serum containing edible vegetable flour containing as stabilizing agent, ionizable salt of tribasic acid, injecting fat base into serum. No. 2,407,027. Reginald Mason and Aage Justesen.

Inorganic

Ozonizing liquids, driving with compressed air expansion engine, expanding and reducing pressure and temperature of air; delivering expanded air to ozonizer chamber having moving element to recirculate air in chamber; subjecting air in chamber to electrical discharge to ozonize, mixing ozonized air with liquid. No. 2,405,553. Donald Allison.

Removal of hydrogen sulphite from gaseous mixtures comprises scrubbing gaseous mixtures with aqueous solution of alkali metal dichromate and salt of zinc, copper, cadmium, mercury, arsenic, tungsten, tin or vanadium, solution of acidity to permit precipitation of sulphides of last mentioned metals and prevent formation of monochromates. No. 2,405,672. Ronald Reitmeier to The Girdler Corp.

Ozonizing apparatus comprising housing having electrical ozone generating means therewithin, means defining communicating passages in housing at opposite ends and along side walls, cooling means in heat exchange relation with side walls, etc. No. 2,405,728. Donald Allison.

Recovering sulphur dioxide from sulphur dioxide-containing gases comprises, contacting gases with ammonia and water to form solution of ammonium bisulphite; reacting ammonium bisulphite with ammonium acid sulphate to evolve sulphur dioxide and form solution of ammonium sulphate. No. 2,405,747. Arthur Hixson and Ralph Miller to The Chemical Foundation, Inc.

Preparing water soluble aluminum phosphates solid at room temperature comprising dispersing reactible compounds consisting of finely divided aluminum hydrate and phosphorus pentoxide or phosphoric acid in separate portions of inert nonaqueous liquid, mixing dispersions, adding water, added water and reduction of evaporation to form product having water content low enough to render product solid. No. 2,405,884. Herbert Greger.

Recovering liquid oxygen from atmospheric air, means for maintaining two bodies of liquid oxygen at different levels, connection whereby body at lower level is maintained under static head of liquid at higher level, condenser within body at higher level, means for delivering vapor from

body at lower level to condenser. No. 2,406,003. Wolcott Dennis to Air Reduction Co.

Improving water-sensitivity of metal salt containing at least one grouping having the general formula described in patent, comprises blowing solution of said salt in inert solvent with weakly acid gas in presence of H_2O. No. 2,406,041. Helmuth Schneider and James Kane to Standard Oil Development Co.

Electrical resistance element durable at high temperature, proof against chemical action, of sintered mass, containing silicon carbide and in smaller quantity, aluminum carbide, aluminum nitride, aluminum silicide or aluminum boride. No. 2,406,275. Axel Wejnarth.

Preparing alumina of high stability and resistance to disintegration, and preparing alumina-molybdenum oxide catalyst of high resistance to disintegration having knife-edge hardness. No. 2,406,420. Harry Weiser and Elgene Smith and Johnstone Mackay to Houdry Process Corp.

Obtaining rutile titanium oxide pigment through calcination and conversion of anatase. No. 2,406,465. John Keats to E. I. du Pont de Nemours & Co.

Uniformly impregnating adsorbent catalyst support with aluminum chloride catalyst in absence of hydrolytic or other reactions. No. 2,406,477. Ernest Solomon and Louis Rubin to The M. W. Kellogg Co.

Removing sulphur from high sulphur nickel-containing mass. No. 2,406,582. Clarence Bieber, Bengt Franke and Walter Sumpter to The International Nickel Co., Inc.

Producing catalytic composite of alumina and other inorganic catalyst for hydrocarbon conversion reactions comprises adding volatilizable ammonium salt to solution of aluminum salt and compound decomposable to inorganic oxide by heating. No. 2,406,646. Glenn Webb and Marvin Smith to Universal Oil Products Co.

Making selenium dioxide, free of elemental selenium, comprises effecting gaseous phase oxidation of vaporized selenium with gas containing oxygen in presence of solid catalyst selected from oxides of copper, chromium and manganese. No. 2,406,666. Charles Clark and Eugene Elkin to Canadian Copper Refiners, Ltd.

Forming solid compositions containing complex metal salt, comprises mixing, agitating together water-soluble solid complexogen metal salt, non-aqueous source of ammine, and second solid, water-soluble and neutral salt which contains anion capable of forming water-insoluble compound with metal of first salt. No. 2,406,692. Grinnell Jones and Walter Juda to Albi Chemical Corp.

Calcined gypsum plaster comprising as dry mixture for gauging with water calcined gypsum capable of setting with water in predominant amount, Portland cement, raw gypsum and commercial retarder. No. 2,406,757. Harry Gardner to Certain-teed Products Corp.

Separating finely divided electrically conducting solids from suspensions in non-conducting liquids comprises, passing slurry of suspension onto continuously moving electrode, etc. No. 2,406,820. Harmon Fisher and Albert Peck to The Permanente Metals Corp.

Refractory composition, comprising pulverulent mixture of ground dry magnesian clinker and aluminum-free hectorite. No. 2,406,909. Robert Schoenlaub to Basic Refractories, Inc.

Treating refractory material, comprises coating surface of basic refractory material particles with magnesium, or calcium hydroxides or oxides, and to react therewith non-aluminous gel-forming hydrous magnesium silicate. No. 2,406,910. Robert Schoenlaub to Basic Refractories, Inc.

Regenerating concentrated sulphuric acid comprises injecting acid in finely divided condition into combustion zone while introducing air and fuel into zone. No. 2,406,930. Nicolay Titlestad to Chemical Construction Corp.

Preparation of anhydrous fusions containing magnesium chloride, improvement comprises maintaining fused body consisting of halide diluent and magnesium chloride. No. 2,406,935. Joseph Wood and Robert MacMullin to The Mathieson Alkali Works, Inc.

Recovering vanadium as vanadophosphate from vanadium-containing phosphoric acid solutions consisting in electrolyzing solutions to form vanadium-containing solid at anode. No. 2,407,008. Arthur Hixson and Ralph Miller to The Chemical Foundation, Inc.

Composition for producing synthetic fog or smoke consisting of titanium tetrachloride and containing phosphorus. No. 2,407,384. Alexander Ritchie to Electric Boat. Co.

Making sulphamide, consists in injecting sulphuryl chloride into stream of ammonia. No. 2,407,481. Edward Degering and George Gross to Purdue Research Foundation.

Tin electrodepositing composition comprising alkali fluoride and stannous chloride. No. 2,407,579. Ernest Schweikher to E. I. du Pont de Nemours & Co.

Medicinal

Obtaining provitamin D from shell fish step comprises treating whole broken open shell fish with caustic alkali to saponify saponifiable constituents and liquefy shell fish meat. No. 2,406,133. William Calcott, George Holbrook and Stockton Turnbull, Jr., to E. I. du Pont de Nemours & Co.

Anti-histaminically active teritiary amine of the formula described in patent. No. 2,406,594. Carl Djerassi and Charles Huttrer and Caesar Scholz to Ciba Pharmaceutical Products Inc.

Tablet of vitamin B-complex comprising amphoteric milk protein and small quantities of vitamins of the B-complex. No. 2,406,741. Walter Compton and Richard Nicholls to Miles Laboratories, Inc.

Synthesis of riboflavin and intermediates. No. 2,406,774. Jonas Kamlet to Miles Laboratories, Inc.

Obtaining sapogenin oxidation products comprises subjecting steroidal sapogenins, sapogentic acids, dihydrosapogenins, sapogenoic acids, or C_{27} lactones, to vigorous oxidation, etc. No. 2,406,885. Russell Marker to Parke, Davis & Co.

Lathering soap-like preparation comprising germicidal mixture. No. 2,406,902. Albert Ramlins to Parke, Davis & Co.

Organic acid containing elements carbon, hydrogen, oxygen, and nitrogen, derived by autolysis of mamalian liver tissue and free from pantothenic acid and antipernicious anemia principle obtainable from liver tissue. No. 2,407,096. Joseph Pfiffner, Stephen Binkley, Edward Bloom and Arthur Emmett to Parke, Davis & Co.

Chemotherapeutic agents of sulphonamide type, formula described in patent. No. 2,407,309. William Lott, Frank Bergeim, and Kathryn Losee to E. R. Squibb & Sons.

Therapeutic composition comprising acidic aqueous solution containing riboflavin and nicotinamide and acidic material. No. 2,407,412. Douglas Frost to Abbott Laboratories.

Veterinary composition consisting of sodium alginate, gum karaya, and phenothiazine. No. 2,407,486. Albert Flenner and Clarence Littler to E. I. du Pont de Nemours & Co.

Optical resolution of racemic pantothenic acid compound, separating by fractional crystallization from solvent comprising lower aliphatic ketone the diastereomeric crystalline pantothenic acid salts of alkaloid of quinine or cinchonidine. No. 2,407,560. Richard Kuhn and Theodor Wieland to Winthrop Chemical Co., Inc.

Metallurgy, Ores

Concentration of ores by flotation comprises subjecting sulphide ore to flotation operation in presence of effective quantity of froth flotation agent comprising reaction product of aliphatic monohydric alcohol, an alkali thiocyanate and carbocyclic acid halide. No. 2,405,581. Cornelius Keller to The Dow Chemical Co.

Galvanizing ferrous metal shapes, comprises passing shapes through atmosphere of ammonium chloride vapors at 420° F. to 824° F., admitting excess air into ammonium chloride vapor, immediately passing shape through galvanizing bath. No. 2,405,592. Arthur Mauger and Alfred Ward.

Material of compacted and sintered agglomerate of platinum, rhodium, iridium, ruthenium, palladium, or alloys of these metals, and refractory oxide, constituents being initially in finely divided condition. No. 2,406,172. Colin Smithells to Baker & Co., Inc.

Converting peat into solid fuel. No. 2,406,509. Claes-Wilhelm Pilo.

Flotation machine, comprising: tank having pulp inlet and outlet openings, froth overflow lip, impeller rotatable in lower portion of tank, air tube rising axially above impeller, radial deflectors surrounding impeller, pulp feed chamber above impeller, etc. No. 2,406,532. Arthur Fahrenwald.

Extracting iron from titaniferous ores comprises dissolving in hydrochloric acid of soluble chloride salt selected from chlorides of alkali metals, alkaline earth metals and aluminum, admixing acid with ground iron-containing titaniferous ore, heating mixture. No. 2,406,577. Hugh Alessandroni and Borivoj Sterk to National Lead Co.

Calcining coal, comprising granulating coal confining granulated coal in calcining chamber, subjecting material by super-heated steam, to increase temperature. No. 2,407,268. Worth Goss to William Carlisle, Jr.

Regenerative coke oven battery. No. 2,407,356. Frans Wethly to Wilputte Coke Oven Corp.

Organic

Manufacture of heterocyclic bases of the general formula described in patent. No. 2,405,555. Franz Bergel, Nathan Hindley, Alexander Morrison and Heinrich Rinderknecht to Hoffmann-La Roche Inc.

Composition of matter comprising amyl imide of 3,6-endomethylene-4-cyclohexene-1,2-dicarboxylic acid. No. 2,405,559. Euclid Bousquet to E. I. du Pont de Nemours & Co.

Manufacture of amino acids from protein material, comprises: subjecting material to hydrolysis by introducing vapor of hydrochloric acid into material, allowing acid vapor to condense in contact with material, filtering resulting hydrolyte mixture to separate hydrolysate from solid residue, evaporating filtered hydrolysate, recycling hot acid vapor. No. 2,405,574. John Gamma to Bryn Mawr Laboratory.

Manufacturing volatile esters of lactic acid comprises heating lactic acid and glycerol or ethylene glycol in presence of acid catalyst, removing water formed during reaction, passing vapors of alcohol through condensation product in presence of esterification catalyst whereby volatile ester of lactic acid is formed. No. 2,405,646. Edward Filachione and Charles Fisher to the Secretary of Agriculture of the United States of America.

Preparing pure pyranthone from impure 2,2′-dimethyl-1,1′-dianthraquinonyl containing 2-halogen-3-methylan-thraquinones, comprises fusing crude 2,2′-dimethyl-1,1′-dianthraquinonyl with phenol and alkali metal hydroxide, diluting fusion mass with ethyl alcohol, filtering off pyranthrone, washing pyranthrone cake with alcohol and water. No. 2,405,702. Henry Lee, Joseph Deinet and Hans Gottlieb to E. I. du Pont de Nemours & Co.

In fluid flowmeter, conduit, inlet into conduit, porous tube in conduit spaced to form annular passage, one end of porous tube closed, means forming seal between other end of porous tube and interior of conduit, sealing means for varying effective length of porous tube, pressure gauge for indicating drop in fluid pressure occasioned by passage of fluid through wall of porous tube. No. 2,405,704. Maryan Matuszak to Phillips Petroleum Co.

Water-soluble surface-active sulphosuccinates within molecular weight range of 536 to 5,000 of formula described in patent. No. 2,405,737. Melvin De Groote and Bernard Keiser to Petrolite Corp., Ltd.

Derivatives of chlormethyl ethers of polyoxyethylene glycols and process of producing. No. 2,405,784. Daniel Geltner to Onyx Oil & Chemical Co.

Derivatives of resinous ethers of hydroxyaryl compounds. No. 2,405,806. Otto Albrecht, Charles Graenacher, Richard Sallman and Carlo Rossi to Society of Chemical Industry in Basle.

Compound of methyl formylchloroacetate and alkali metal salts thereof. No. 2,405,820. Herman Faith to Allied Laboratories, Inc.

Preparing diallyl phthalate comprises esterifying allyl alcohol with phthalic anhydride in contact with acid catalyst of esterification. No. 2,405,842. John Magrane, Amos Esterly and Richard Davies to Catalin Corp. of America.

Preparing solution of alkaline earth alginate comprising introducing into aqueous molecularly dehydrated alkali metal polyphosphates or alkali citrates, introducing alkaline-earth alginate. No. 2,405,861. Charles Tod to Albright & Wilson Ltd.

Manufacture of acid soluble condensation product from dicyanodiamide, urea, ammonium chloride and formaldehyde. No. 2,405,863. Jules Treboux to J. R. Geigy A. G.

In chemical synthesis, the step which comprises subjecting alpha hydroxy isopropyl methyl ketone to treatment with solution of hypochlorite, to oxidize to hydroxy isobutyric acid. No. 2,405,873. Joseph Blumenfeld.

Cyclohexyl alpha, alpha, beta-trihalo propionates. No. 2,405,894. Joy Lichty to Wingfoot Corp.

Preparation of ethylene glycol diformate comprises reacting ethylene glycol with carbon monoxide in presence of alkali metal alkoxide catalyst. No. 2,405,936. Edward Bartlett to E. I. du Pont de Nemours & Co.

Preparing dihaloalkanes comprise heating 84 parts by weight propylene with 96.5 parts concentrated hydrochloric acid, 45 parts formaldehyde, 54 parts hydrogen chloride. No. 2,405,948. William Gresham to E. I. du Pont de Nemours & Co.

Synthesis of formaldehyde cyanhydrin comprises co-oxidation of ammonia and methanol in presence of ferric molybdate catalyst. No. 2,405,963. Alfred Larson to E. I. du Pont de Nemours & Co.

Preparation of nitrilotriacetonitrile comprises reacting aminoacetonitrile

with formaldehyde and hydrogen cyanide in presence of aqueous mineral acid catalyst. No. 2,405,966. Donald Loder to E. I. du Pont de Nemours & Co.

Preparation of diester of diglycolic acid comprises subjecting ester of (alkoxymethoxy) acetic acid to reaction with carbon monoxide in presence of boron fluoride catalyst. No. 2,405,967. Donald Loder to E. I. du Pont de Nemours & Co.

Producing purified epsiloncaprolactam consists in bringing vaporized mixture of water and epsilonaminocapronitrile into contact with dehydration catalyst at elevated temperature, withdrawing and condensing reaction vapors, subjecting condensate to distillation at sub-atmospheric, agitating lactam-containing residue with organic carboxylic ester, subjecting treated lactam-containing residue to vacuum distillation. No. 2,405,-969. Elmore Martin to E. I. du Pont de Nemours & Co.

Preparing carbohydrate ethers from formic acid swelled starch, comprises etherifying swelled starch in anhydrous mixture of caustic alkali and etherifying agent. No. 2,405,973. Peter Nichols, Jr., and Robert Hamilton to the Secretary of Agriculture of the United States of America.

Organo-silicon ester having formula described in patent. No. 2,405,988. Arthur Barry to The Dow Chemical Co.

Dividing white alkali metal rosinate from dark alkali metal rosinate characterized by step of subjecting heterogeneous mixture of alkali metal rosinates to solvent action of solution of rosin in petroleum solvent. No. 2,406,097. Avery Morton.

Substituted hydrobenzyl alcohol selected from group of dimethyl (butyl) hexahydrobenzyl alcohol, isohexenyl tetrahydrobenzyl alcohol and isohexyl hexahydrobenzyl alcohol. No. 2,406,106. Alfred Rummelsburg to Hercules Powder Co.

Producing monomeric tetrafluoroethylene comprises heating polymeric tetrafluoroethylene above decomposition point under reduced pressure, collecting resulting monomeric tetrafluoroethylene gas. No. 2,406,153. Ernest Lewis to E. I. du Pont de Nemours & Co.

Manufacture of surface-active compounds described in patent. No. 2,406,-186. Alfred Baldwin, Noel Cusa and Henry Worthington to Imperial Chemical Industries Ltd.

Preparing chlorides of methane comprises reacting methyl chloride or mixtures of methyl chloride and methane with chlorine, etc. No. 2,-406,195. Oliver Cass to E. I du Pont de Nemours & Co.

Composition, consisting of hydroxyacetylated drastically-oxidized ricinoleic acid compound selected from blown castor oil, blown triricinolein, blown diricinolein, blown monoricinolein, blown superglycerinated castor oil, superglycerinated blown castor oil, blown ricinoleic acid, blown polyricinoleic acid, and blown castor oil estolides. No. 2,406,206. Melvin De Groote, Bernhard Keiser and Arthur Wirtel to Petrolite Corp. Ltd.

Treating rosin, by heating under conditions promoting decarboxylation, circulating sulphur dioxide gas into, through, and out of reaction vessel during heating. No. 2,406,338. Laszlo Auer.

Reacting thiolcarboxylic acid with alpha-acylaminoalpha, beta-ethylenically unsaturated carboxylic acids or functional derivatives thereof which revert to acid on hydrolysis, hydrolyzing addition product to corresponding alpha-amino-beta-mercapto carboxylic acid. No. 2,406,362. Mark Farlow to E. I. du Pont de Nemours & Co.

Producing organic sulphide comprises hydrogenating organic compound containing carbonyl group in presence of thiol and sulphactive hydrogenation catalyst. No. 2,406,410. Frank Signaigo to E. I. du Pont de Nemours & Co.

Surface active composition consisting of compound of formula described in patent. No. 2,406,423. Willard Woodstock to Victor Chemical Works.

Substituted 5-nitro-1,3-dioxanes having the general formula described in patent. No. 2,406,504. Glen Morey to Commercial Solvents Corp.

Preparing higher acrylic esters by alcoholysis of methyl acrylate. No. 2,406,561. Chessie Rehberg to the Secretary of Agriculture of the United States of America.

Production of p-nitroacetanilide, comprises mixing acetenalide with concentrated nitric acid and adding resulting liquid to cooled concentrated sulfuric acid. No. 2,406,578. Edward Bart to American Cyanamid Co.

Producing allyl allyloxyacetate which comprises preparing aqueous mixture containing allyl alcohol, chloroacetic acid, reagent which acts as base. No. 2,406,590. Gaetano D'Alelio to General Electric Co.

Mixtures of isomeric triazole derivatives and process of preparing. No. 2,406,591. Gaetano D'Alelio to General Electric Co.

Contacting mixture of halogenated silane having Sibonded halogen atoms replaceable by hydrogen and material selected from hydrogen and hydrogen halides, with metal selected from aluminum, magnesium and zinc, thereby to replace halogen atoms with hydrogen. No. 2,406,605. Dallas Hurd to General Electric Co.

Making polysiloxane resins comprises dissolving mixture of methyl chlorosilanes in aromatic hydrocarbon solvent and adding resultant solution to two-phase hydrolysis medium. No. 2,406,621. James Marsden to General Electric Co.

Manufacturing solid, dry stable invertase preparations, consists of treating pressed yeast with ethers mixable with water of the group m-dioxane, p-dioxane, dioxalane, dimethyl dioxane and mixtures of dioxane with ethyl ether. No. 2,406,624. Carl Neuberg and Irene Roberts to Sun Chemical Corp.

Amino alcohol esters of a p-aminomethylbenzoic acid having the formula described in patent. No. 2,406,627. Robert Parker and Arthur Hill to American Cyanamid Co.

Producing cyclo-olefinic hydrocarbon comprises reacting glycol and monoolefinic hydrocarbon in presence of acid-acting catalyst. No. 2,406,630. Herman Pines and Vladimir Ipatieff to Universal Oil Products Co.

Producing cyclo-olefinic hydrocarbon comprises reacting glycol and monohydric alcohol. No. 2,406,631. Herman Pines and Vladimir Ipatieff to Universal Oil Products Co.

Producing cyclo-olefinic hydrocarbon comprises reacting diolefinic hydrocarbon and monohydric alcohol. No. 2,406,632. Herman Pines and Vladimir Ipatieff to Universal Oil Products Co.

Manufacturing water-soluble esters of lactic acid in anhydrous forms. No. 2,406,648. Samuel Weisberg, Edwin Stimpson, Joseph Greenspan and Donald Othmer to Sealtest, Inc.

Extraction of alcohol-insoluble casein from seeds comprises the treatment of seeds with solution containing alkaline reagent, water and acetone. No. 2,406,650. Robert Wormell to Courtaulds, Ltd.

Ketols from isophorones and homologues. No. 2,406,652. Seaver Ballard and Vernon Haury to Shell Development Co.

Acylacetamino-1,2,4-triazole of general formula described in patent. No. 2,406,654. Abraham Bavley to General Aniline & Film Corp.

Preparation of 3-acetoxymethylene, 3.6 endoxohexahydrophthalic anhydride having melting point of 129-130° C., including reducing condensation product of furfuryl acetate and maleic anhydride with hydrogen in presence of palladium-carbon catalyst. No. 2,406,657. William Bitler and Leonard Nicholl to Kay-Fries Chemicals, Inc.

Manufacture of vinyl n-butyl ether, comprises bringing acetylene and n-butyl alcohol into contact with potassium alkoxide in medium composed of secondary and tertiary aromatic amines. No. 2,406,674. William Evans to Imperial Chemical Industries Ltd.

Recovery of dihydric alcohols from crude aqueous mixtures, improvement comprising adding to mixture formaldehyde and acid acetalization catalyst. No. 2,406,713. Murray Senkus to Commercial Solvents Corp.

Purifying oil-soluble petroleum sulphonates containing inorganic salts and water, comprises contacting sulphonates with low viscosity hydrocarbon solvent. No. 2,406,763. William Griesinger to The Atlantic Refining Co.

Separating pyrolysis products of chlorodifluoromethane. No. 2,406,794. Anthony Benning, Frederick Downing and Joseph Park to Kinetic Chemicals. Inc.

New chemical compound, tri-2-ethylhexyl phosphate. No. 2,406,802. Thomas Carruthers to Carbide & Carbon Chemicals Corp.

Polyvinyl fluoride stable against discoloration and decomposition when heated 5 minutes at 225° C., comprising polyvinyl fluoride having dicyclohexylamine dispersed therethrough. No. 2,406,837. Frederick Johnston to E. I. du Pont de Nemours & Co.

N-benzyl-N-cetyl morpholinium ethosulfate. No. 2,406,892. Joseph Niederl and Martin McGreal.

Manufacture of formaldehyde comprising inner and outer concentric shells defining catalyst annulus, means for passing methanol and oxygen vertically through catalyst annulus. No. 2,406,908. Pierre Schideler and Ralph Richardson to Chemical Construction Corp.

Amination catalyst comprising cobalt in suspension on carrier of hydrated magnesium silicate. No. 2,406,929. John Teter to Sinclair Refining Co.

Preparing heavy metal salt of dithiocarbamic acid comprises adding water-soluble salt of strong base and weak acid to aqueous solution of water-soluble salt of dithiocarbamic acid, adding water-soluble salt of heavy metal to precipitate heavy metal salt of the dithiocarbamic acid. No. 2,406,960. Arthur Neal and Bernard Sturgis to E. I. du Pont de Nemours & Co.

Sulphonating pyridine in 3 position, comprises periodical additions of oleum and mercury, aluminum, magnesium or vanadium or their sulphates to solution of pyridine sulphate in oleum under sulphonating temperatures. No. 2,406,972. Edmond Tisza and Bernard Duesel to Pyridium Corp.

Producing sugar derivatives comprises heating sugar containing glycol with 2 to 3 carbon atoms or dihydric inter-ether of glycol in presence of strong mineral acid catalyst. No. 2,407,001. William Griffin to Atlas Powder Co.

Glycol glucosides and derivatives. No. 2,407,002. William Griffin to Atlas Powder Co.

Emulsifying agents produced from glycol glucosides and process for production. No. 2,407,003. William Griffin to Atlas Powder Co.

Lubricating moving metallic surfaces comprises maintaining between bearing surfaces lubricant film comprising hydrolysis product of organic silicane. No. 2,407,037. Frank Sowa.

Manufacture of vinyl chloride comprises passing acetylene and hydrogen chloride into suspension of active carbon impregnated with mercuric chloride in inert diluent. No. 2,407,039. Herberg Stanley to The Distillers Co., Ltd.

Manufacture of phenols comprises, preparing solid mixture of salt of mono-sulphonic acid and inorganic base. No. 2,407,044. Daniel Tyrer.

Manufacture of phenols or salts thereof comprises, preparing intimate solid mixture of alkali metal salt of sulphonic acid, caustic alkali and oxide or hydroxide of calcium, barium, strontium and magnesium. No. 2,407,045. Daniel Tyrer.

Producing furoic acid from furfural comprises suspending furfural and catalyst comprising base metal oxide and noble metal oxide in aqueous medium while supplying excess of elemental oxygen. No. 2,407,066. Andrew Dunlop to The Quaker Oats Co.

Making composition of matter, comprises reacting native starch in aqueous suspension with water soluble urea-formaldehyde condensation product or water soluble melamine-formaldehyde condensation product. No. 2,407,071. Lowell Gill and John McDonald to A. E. Staley Manufacturing Co.

Preparation of halogenated derivatives of hydrocarbons comprises reacting hydrogen fluoride and chlorine simultaneously with methane in presence of chromium fluoride. No. 2,407,129. Anthony Benning and Joseph Park to Kinetic Chemicals, Inc.

Producing 2-cyanoethyl 2-thiazyl sulphide comprises condensing 2-mercapto-thiazole with acrylonitrile in presence of catalyst. No. 2,407,138. Albert Clifford and Joy Lichty to Wingfoot Corp.

Compounds formed by mixing and reacting halide or anhydride of carboxylic acids, dicyandiamide, water-soluble alkali-metal hydroxide or alkaline earth metal hydroxide and water. No. 2,407,161. Donald Kaiser and Jack Thurston to American Cyanamid Co.

Derivatives of 1-hydroxyphenyl-3-aminobutane and processes for production. No. 2,407,167. Fritz Kulz.

Production of 2,6-nitro chlor benzyl alcohol from brominated mixture containing 2,6-nitro chlor benzyl bromide together with 2,6-nitro chlor toluene. No. 2,407,182. Frederic Sievenpiper to Allied Chemical & Dye Corp.

Alpha-amino-gamma-alkoxybutyric acids and method of preparing. No. 2,407,203. Quintin Cole and Richard Roblin, Jr. to American Cyanamid Co.

Triazolo (d) pyrimidines and methods of preparing. No. 2,407,204. Jackson English, James Vaughan and Richard Roblin, Jr. to American Cyanamid Co.

Producing p-phenylene diamines. No. 2,407,207. Ilmari Salminen and Arnold Weissberger to Eastman Kodak Co.

Production of cyclopentane from benzol forerunnings of coal tar distillate. No. 2,407,214. Stanley Birch, Frederick Fidler and Leslie Thornes to Anglo-Iranian Oil Co., Ltd.

Fluoro-chloro hydrocarbons and processes of making. No. 2,407,246. Anthony Benning and Joseph Park to Kinetic Chemicals, Inc.

Inhibiting spontaneous ignition of tetraethyl lead adsorbed on sludges precipitated from crude steam distilled tetraethyl lead comprises incorporating with sludges aqueous solution of alkali metal or ammonium monosulfides, polysulfides or sulfhydrates. No. 2,407,261. Frederick Downing and Adrian Linch to E. I. du Pont de Nemours & Co.

Inhibiting spontaneous ignition of tetraalkyl lead compounds adsorbed on sludges which precipitated from crude tetraalkyl lead compounds, comprises incorporating with sludges oil soluble copper salts of carboxylic acids or oil soluble iron salts of carboxylic acids. No. 2,407,263. Adrian Linch to E. I. du Pont de Nemours & Co.

Preparing copper compounds of mercaptans derived from terpenes. No.

2,407,265. Arthur Fox to E. I. du Pont de Nemours & Co.

Copper compound of mercaptan derived from pinene. No. 2,407,266. Arthur Fox to E. I. du Pont de Nemours & Co.

Preparing triethyl phosphate comprises reacting phosphorus pentoxide with diethyl ether in excess. No. 2,407,279. David Hull and Jerry Snodgrass to Eastman Kodak Co.

Making olefin comprises passing vaporous mixture of carbonyl compound capable of keto-enol tautomerism and alcohol capable of dehydrogenation to carbonyl compound, over silica gel catalyst. No. 2,407,291. William Quattlebaum, Jr., and Walter Toussaint to Carbide & Carbon Chemicals Corp.

Compounds selected from organic thiocyanates. No. 2,407,292. Paul Salzberg to E. I. du Pont de Nemours & Co.

Preparing unsaturated carboxylic ester comprising condensing, in presence of acid catalyst ketene with diketone. No. 2,407,301. John Spence and Edward Degering to Purdue Research Foundation.

Preparing carboxylic ester comprising condensing, in presence of acid catalyst keten with ketocarboxylic ester. No. 2,407,302. John Spence and Edward Degering to Purdue Research Foundation.

Inhibiting spontaneous ignition of tetraalykyl lead compounds adsorbed on sludges comprises washing sludges with p-amino phenol. No. 2,407,307. Adrian Linch to E. I. du Pont de Nemours & Co.

Purifying crude acetylene comprising contacting acetylene with arsenic trichloride. No. 2,407,332. Richard Wearn and Gordon Jarman.

Mixing alcohol in sulphuric acid and introducing sulphur dioxide and chlorine. No. 2,407,344. Cortes Reed to Charles Horn.

Converting neutralized o-chlorobenzoic acid or o-bromobenzoic acid into o-sulphobenzoic acid, comprises heating in aqueous medium with inorganic sulphite in presence of copper or copper salts. No. 2,407,351. Walter Stammbach to J. R. Geigy A. G.

Tetrafluoroethylene stabilized with hydrocarbon thiol. No. 2,407,396. Merlin Brubaker to E. I. du Pont de Nemours & Co.

Tetrafluoroethylene stabilized with ethylenically unsaturated hydrocarbon. No. 2,407,405. Melvin Dietrich and Robert Joyce, Jr. to E. I. du Pont de Nemours & Co.

Tetrafluoroethylene stabilized with tertiary hydrocarbon amine. No. 2,407,419. William Hanford to E. I. du Pont de Nemours & Co.

Unsaturated esters of carbonic acid and polymers. No. 2,407,446. Maxwell Pollack to Pittsburgh Plate Glass Co.

Manufacture of beta-substituted derivatives of indole. No. 2,407,452. Robert Robinson and Rita Cornforth and Trustham West to Stafford Allen & Sons, Ltd.

Making mixture of unsaturated nitriles comprises reacting methyl acetylene or allene with hydrogen cyanide in presence of catalytic agent containing cadmium, magnesium, or zinc. No. 2,407,472. Darrel Butterbaugh and Le Roy Spence to Rohm & Haas Co.

Unsaturated bicyclic carbonylic compounds and preparation. No. 2,407,508. Rupert Morris and Edward Shokal to Shell Development Co.

Making lead alkyl with lead sodium alloy includes mixing graphite with lead sodium alloy. No. 2,407,551. Sam Heron to Ethyl Corp.

Reaction product of 2-aminothiazoline with zinc salt of 2-mercaptothiazole. No. 2,407,565. Roger Mathes to The B. F. Goodrich Co.

Bisdimethylene thiuram polysulphides, formula described in patent. No. 2,407,566. Roger Mathes and Paul Jones to The B. F. Goodrich Co.

Low-freezing aromatic nitro-compound mixture consists of mixture of isomeric dinitrotoluenes liquid at temperatures approximating melting point of ice, and trinitrotoluene and tetryl. No. 2,407,597. Harold Wright and James Taylor to Imperial Chemical Industries, Ltd.

Deodorizing non-volatile fatty materials containing free fatty acids and odorous materials, comprises passing steam through body of fatty material removing vapors to reduce free fatty acids. No. 2,407,616. Guy Phelps and Howard Black to Industrial Patents Corp.

Packaging

Forming seal between adjacent flat sheets of packaging material having opposed surfaces of thermoplastic sealing material comprises clamping sheets along edges of zone to be sealed, forming pressure chamber with clamping member, then admitting hot fluid under pressure to chamber. No. 2,405,675. Charles Southwick, Jr. and Arthur Stagmeier to General Foods Corp.

Anode for electrolytic protection of closed containers. No. 2,405,776. Bengt Brolinson.

Oval can feed. No. 2,405,805. John Albertoli.

Method of manufacturing infusion packages. No. 2,406,018. Hans Irmscher to National Urn Bag Co., Inc.

Siftproof carton. No. 2,406,061. Thomas Cass, Jr. to Container Corp. of America.

Machine for sealing ampoules of fusible material. No. 2,406,101. Alf Pipping.

Automatic container filling device. No. 2,406,263. Theodore St. Clair, Carl Sievers and Andrew Olson to Phillips Petroleum Co.

Closure comprising shell and sealing element including cured alkyd resin. No. 2,406,298. Ellis King to Armstrong Cork Co.

Sealed moistureproof paper package. No. 2,406,301. James Lively.

Liquid containers such as those of electric accumulators. No. 2,406,592. Benjamin Davies to United Ebonite & Lorival, Ltd.

Unitary article consisting in bag for packaging comprising inner longitudinal flat sleeve longitudinally gusseted at edges, and outer longitudinal flat cover, each of tubular form, etc. No. 2,406,660. Charles Brady to Bemis Bro. Bag Co.

Bag closure. No. 2,406,661. Charles Brady to Bemis Bro. Bag Co.

Manufacturing container consisting in providing flexible bag-like fibered foundation closed at one end having open mouth, impregnating and coating both surfaces of foundation with thin coating of liquid resin to be hardened and polymerized by application of heat, etc. No. 2,406,678. James Gerahty.

Device for vacuum sealing screw-cap container having reduced threaded neck and shoulder beneath neck. No. 2,406,771. Edward Hughes to Bernardin Bottle Cap Co., Inc.

Machine for applying protective overcaps to moving containers. No. 2,406,784. August Almgren to American Can Co.

Automatic weighing apparatus embodying a totalizing mechanism. No. 2,406,897. Alfred Page to W. & T. Avery, Ltd.

Preventing discoloration of cap lining material containing tannin through contact with ferrous cap, comprises treating material with acid aqueous solution containing salt of metaphosphoric or pyrophosphoric acids. No. 2,406,898. Wilson Palmer to Continental Can Co., Inc.

Container for adhesive tape. No. 2,406,900. William Punte to Continental Can Co., Inc.

Weighing and dispensing apparatus. No. 2,406,934. Ralph Williams and Leon Nowak, Jr. to B. F. Gump Co.

Filling machine. No. 2,407,053. John Belada to Owens-Illinois Glass Co.

Closure device for rendering bottles nonrefillable. No. 2,407,063. Jose del Ilano, one-fourth to Ricardo Ferrer.

Packaging machine. No. 2,407,313. Clarence Malhiot to F. B. Redington Co.

Cover-removing tool for containers. No. 2,407,428. Stanley Kretchman.

Paints, Pigments

Anti-corrosive oil paint comprising as vehicle constituent glyceride drying oil and as pigment constituent, plumbate of alkaline earth metal in which lead is present as lead peroxide combined with alkaline earth metal oxide. No. 2,406,307. Norman Read to Goodlass Wall & Lead Industries, Ltd.

Treating fatty oils having drying properties, to improve film-forming characteristics by incorporating in oil polyhydroxy benzene as active treating agent, and heating mixture. No. 2,406,337. Laszlo Auer.

Producing improved cadmium sulfide pigment comprises precipitating cadmium sulfide by reacting sulfate with barium sulfide in presence of aqueous slurry suspension of raw lithopone pigment consisting of co-precipitated mixture of zinc sulfide and barium sulfate, recovering and calcining zinc-containing cadmium sulfide. No. 2,406,472. Ludwig Nerlinger to E. I. du Pont de Nemours & Co.

Improved vegetable drying oil coating composition containing lead salt of hydroxy aromatic acid. No. 2,406,609. Leonard Kebrich and Edwin Peterson to National Lead Co.

Making wrinkle varnish base by heating glycerine with sodium acetate or sodium hydroxide, adding non-conjugated double-bonded drying oil and heating, adding natural resin and heating. No. 2,407,623. William Waldie to New Wrinkle, Inc.

Paper, Pulp

Coating continuous web of paper or analogous material, web carrying roll; resilient surfaced applicator, fountain having open side directed toward applicator roll, doctor roll mounted in fountain for cooperating with applicator roll in controlling amount of coating material applied, means for supplying coating material to fountain. No. 2,406,056. William Barrett to Minnesota & Ontario Paper Co.

Coating unit including backing means, applicator roll for transferring coating material to material, fountain having open side directed toward applicator roll, metering roll mounted in fountain, doctor roll above applicator roll. No. 2,406,057. William Barrett and Bernard Asdell to Minnesota & Ontario Paper Co.

Utilizing waste sulfate liquor comprises concentrating liquor while contacting with air in quantity to eliminate evolution of hydrogen sulfied during evaporation, then concentrating oxidized liquor to solids, etc. No. 2,406,581. Hilding Bergstrom and Karl Trobeck.

Producing lignin material from black liquor comprising carbonating same with oxygen and carbon dioxide-containing gases. No. 2,406,867. George Tomlinson and George Tomlinson, Jr. to Howard Smith Paper Mills, Ltd.

Anti-fungus wrapper of moisture-resistant coated paper, having a small percent of lower dialkyl dichloro succinate in coating. No. 2,406,990. George Borden, Jr. and Karl Karlson to Riegel Paper Corp.

Surface coating tissue paper with thermo-responsive resin. No. 2,407,549. Irving Gurwick.

Petroleum

Improving anti-knock value of narrow cut normally liquid gasoline fraction of low anti-knock value containing normally liquid straight chain olefin and paraffin hydrocarbons, comprises reacting fraction with low-boiling isoparaffin in presence of alkylation catalyst. No. 22,786. Arthur Goldsby to The Texas Co.

Leaded-gasoline for use in spark-ignition internal conbustion engines containing small amount of tributyl phosphite. No. 2,405,560. John Campbell to General Motors Corp.

Two stage continuous flow process of isomerization and alkylation of normal paraffins for production of saturated hydrocarbons of higher molecular weight, using halide catalyst. No. 2,405,565. Eric Fawcett and Gwilym Jenkins to Anglo-Iranian Oil Co., Ltd.

Making composition capable of liberating oxygen upon contact with exhaled air comprises providing intimate dry mixture of alkali metal peroxide and minor proportion of dry solid acidic substance, heating mixture, producing hard, bonded, porous mass of peroxide containing alkali metal salt of acidic substance. No. 2,405,566. David Feigley, Jr. to Mine Safety Appliances Co.

Making alkali metal oxide comprises spraying molten alkali metal into current of atmosphere containing oxygen and gas inert to metal, oxidizing metal, supplying atmosphere to provide excess of oxygen. No. 2,405,580. Carey Jackson to Mine Safety Appliances Co.

Lubricant comprising mineral lubricating oil base stock and reaction product of combination of sulfur and phosphorus with product obtained by reacting phenol with sulfur chloride derivative of an olefin. No. 2,405.607. Dilworth Rogers to Standard Oil Development Co.

Lubricant comprising mineral lubricating oil base stock and metal salt of reaction product of combination of sulfur and phosphorus with product obtained by reacting phenol with sulfur chloride derivative of olefin. No. 2,405,608. Dilworth Rogers to Standard Oil Development Co.

Producing toluene from hydrocarbon product obtained by hydrogenation of carbon moxoxide. No. 2,405,660. Norman Linn to Standard Oil Development Co.

Reclaiming grease from heavier liquids consists in filling closed vessel to form liquid body of mixture of grease and heavier liquid by passing mixture into vessel thru inlet passage extending above level of liquid in vessel, etc. No. 2,405,705. William Mobley.

Production of hydrocarbon oil concentrates of barium and strontium alcoholates, improvement comprises reacting compound of class of oxides and hydroxides of barium and strontium with alcohol comprising aliphatic primary alcohol group in high-boiling hydrocarbon medium at 200° C. No. 2,405,712. William Russel to R. T. Vanderbilt Co., Inc.

Service conduit for conducting liquefied petroleum gas fuel in liquid phase, means confining body of water to circulate in fuel vaporizing relation with conduit in adjacency, means disposed between conduit and body of water throughout adjacency, restricting interchange of heat. No. 2,405,846. Robert Poethig to The Bastian Blessing Co.

Removing weakly acidic sulphur compounds from hydrocarbon oil comprises contacting oil with aqueous solution containing 5% free alkali metal hydroxide and sufficient soluble reaction products of alkali and

high-boiling tar acids. No. 2,405,872. George Ayers and Daniel Barton to The Pure Oil Co.

Alkylating aromatic hydrocarbon comprises reacting molar excess of hydrocarbon with alkylating agent under pressure in presence of solid acid alkylation catalyst under alkylation conditions, separating unalkylated aromatic hydrocarbon from reaction products, contacting part with sulfuric acid to reduce thiophene content, returning treated hydrocarbon to alkylation reaction. No. 2,405,874. Edwin Bullard, John Anderson, and Sumner McAllister to Shell Development Co.

Recovering hydrocarbon polymer for gasoline comprising contacting olefinic C_4 fraction, with sulphuric acid, separating residual C_4 fraction from reaction mixture, neutralizing free acid fractionally distilling neutralized fraction to separate polymer, contacting polymer with siliceous solid adsorptive material below evaporization temperature of polymer. No. 2,405,905. Hans Schindler to The Pure Oil Co.

Fluid catalyst catalytic cracking. No. 2,405,922. Joseph Wyman and Henry Loeb to Shell Development Co.

Producing aromatics from cracked naphtha fraction boiling now lower than 150° F. and not above 350° F. No. 2,405,935. James Anderson, Jr. to Standard Oil Development Co.

Converting higher boiling hydrocarbons to lower boiling hydrocarbons comprises mixing heavy hydrocarbon oil with oil of powdered Super Filtrol in mixing zone to form catalyst-oil slurry, heating slurry to elevated temperature so that hydrocarbon oil is completely vaporized and is maintained at conversion temperature in presence of Super Filtrol particles, separating vapors from catalyst articles. No. 2,405,959. Paul Kuhl and Robert Shepardson to Standard Oil Development Co.

In continuous alkylation of ethylene with isobutane in continuous operation employing hydrocarbon $AlCl_3$ complex catalyst, improvement comprises feeding hydrocarbon stream containing ethylene and undesired components to scrubbing zone, feeding recycle product stream saturated with undesired components of feed to scrubbing zone, contacting hydrocarbon stream with recycled product in scrubbing zone whereby only ethylene is dissolved in recycled product, etc. No. 2,405,968. Charles Lynch and Howard Codet to Standard Oil Development Co.

Averaging liquid petroleum fraction comprised of normal hydrocarbons, with another petroleum fraction containing isopentane, in presence of liquid hydrogen fluoride in which is dissolved boron trifluoride. No. 2,405,993. Robert Burk to The Standard Oil Co.

Catalytically treating hydrocarbons, comprises treating propane and pentane with liquid hydrogen fluoride in which is dissolved boron trifluoride. No. 2,405,994. Robert Burk to The Standard Oil Co.

Treating hydrocarbon mixture containing aromatic and non-aromatic hydrocarbons with composition comprising liquid hydrogen fluoride containing boron trifluoride therein, whereupon aromatic hydrocarbons form complex with fluoride composition as principal action. No. 2,405,995. Robert Burk to The Standard Oil Co.

Catalytically averaging hydrocarbons which comprises reacting light hydrocarbon fraction comprising normal hydrocarbons and heavier hydrocarbon fraction in presence of liquid hydrogen fluoride in which is dissolved boron trifluoride as primary inorganic catalytic ingredients. No. 2,405,996. Robert Burk to The Standard Oil Co.

Catalytically averaging hydrocarbons comprises reacting normally liquid hydrocarbon fraction comprising paraffinic hydrocarbons and lighter hydrocarbon fraction comprising normal pentane, in presence of liquid catalyst the inorganic ingredients of which comprise liquid hydrogen fluoride in which is dissolved boron trifluoride. No. 2,405,997. Robert Burk to The Standard Oil Co.

Polymerizing normally gaseous olefins to liquid hydrocarbons, comprises contacting olefins at polymerizing temperature with bauxite activated by heating between 700 degrees F. and 1800 degrees F. to residual moisture content of 6% by weight. No. 2,406,081. William La Lande, Jr. and Heinz Heinemann to Porocel Corp.

Alkylation process comprises reacting isoparaffin with olefin in presence of liquid hydrogen fluoride catalyst to which has been added hydrogen cyanide. No. 2,406,086. Carl Linn to Universal Oil Products Co.

Manufacturing branched chain paraffin hydrocarbons comprises reacting mono-olefinic hydrocarbon with methyl halide in presence of lead oxide to produce higher molecular weight mono-olefin, hydrogenating mono-olefin to paraffin. No. 2,406,110. Louis Schmerling to Universal Oil Products Co.

Catalytic conversion of hydrocarbon fluid comprises contacting fluid in admixture with water vapor as diluent and heat carrier, with water-resistant contact catalyst to effect conversion of substantial proportion of hydrocarbon fluid, etc. No. 2,406,112. Walter Schulze to Phillips Petroleum Co.

Reforming hydrocarbon in presence of catalyst which consists of reducible metal oxide of group VI of periodic system carried on alumina-containing base and added free hydrogen. No. 2,406,117. Albert Welty, Jr. to Standard Oil Development Co.

Continuous catalytic hydrogenation of sulfur-containing hydrocarbon oils to effect removal of sulfur while maintaining anti-knock properties, improvement comprises effecting hydrogenation with active preformed heavy metal sulfide hydrogenation catalyst. No. 2,406,200. Robert Cole to Shell Development Co.

Sweating oily wax to produce oil-free wax, determining refractive indices and melting points of samples of sweat stream, terminating sweating when sample exhibits melting point higher than preceding sample, and refractive index at least as great. No. 2,406,210. Seymour Ferris to The Atlantic Refining Co.

In cracking and coking of hydrocarbon oils process comprises passing condensate stock through heating coil at high cracking temperature, delivering heated stream into lower portion of vertically disposed reaction chamber wherein separation of vapors from liquid residue, etc. No. 2,406,312. Joseph Barron to The Texas Co.

In cracking and coking of hydrocarbon oils process comprises passing condensate oil through heating coil at high cracking temperature, delivering heated stream into lower portion of vertically disposed reaction chamber under superatmospheric pressure, wherein separation of vapors from liquid residue takes place, etc. No. 2,406,313. Joseph Barron to The Texas Co.

Production of aviation gasoline and aviation base stock comprises dividing synthetic crude from cracking operation into four cuts, subjecting second and fourth cuts to high activity cracking catalysts, combining products from catalytic operation in boiling range of aviation gasoline with first and third of cuts to make aviation base stock. No. 2,406,394. Roger Newton to Houdry Process Corp.

Hydrocarbon oil conversion process comprises providing bed of fresh cracking catalyst and maintaining bed at catalytic conversion temperature during processing, etc. No. 2,406,547. Paul Kuhl and Albert Welty, Jr. to Standard Oil Development Co.

Lubricant comprising lubricating oil and pour-depressing amount of Friedel-Crafts condensation product of aromatic compound and saturated ester. No. 2,406,549. Eugene Lieber to Standard Oil Development Co.

Catalytically converting residual oils containing constituents unvaporizable without substantial decomposition into motor fuel wherein oil is cracked in presence of solid adsorbent catalyst in subdivided form and catalyst regenerated at temperature higher than cracking temperature. No. 2,406,555. Homer Martin to Standard Oil Development Co.

Compounded lubricating oil. No. 2,406,564. Dilworth Rogers and John McNab to Standard Oil Development Co.

Improved lubricant comprising hydrocarbon material and solute therein comprising cyclicized, phosphorous pentasulfide treated, polymer of polyolefin. No. 2,406,575. David Young and Harris Hineline to Standard Oil Development Co.

Conversion process comprises subjecting hydrocarbon oil to action of composite catalyst comprising silica, alumina and zirconia prepared by hydrolytically absorbing alumina and zirconia on purified silica hydrogel, and heating. No. 2,406,613. Edward Lee, deceased, by James Cullinan, administrator, and Charles Thomas to Universal Oil Products Co.

Conversion process comprises subjecting hydrocarbon oil to action of catalyst comprising silica, alumina, and zirconia prepared by compositing purified silica gel—with decomposable salts of aluminum and zirconium and heating. No. 2,406,614. Edward Lee, deceased, by James Cullinan, administrator, and Charles Thomas to Universal Oil Products Co.

Catalytic conversion of saturated hydrocarbon reactant wherein reactant is commingled with hydrogen halide promoter and subjected to conversion conditions in presence of promoter and aluminum halide catalyst. No. 2,406,622. Julian Mavity to Universal Oil Products Co.

Isomerization process comprises contacting normally liquid paraffin hydrocarbon and an ether having the formula R—O—R'. No. 2,406,633. Herman Pines and Richard Wackher to Universal Oil Products Co.

Isomerization process comprises contacting normally liquid paraffin hydrocarbon with Friedel-Crafts type isomerizing catalyst. No. 2,406,634. Herman Pines and Richard Wackher to Universal Oil Products Co.

Conversion of hydrocarbons comprises reacting hydrocarbon in presence of alkoxyaluminum halide catalyst. No. 2,406,639. Louis Schmerling and Vladimir Ipatieff to Universal Oil Products Co.

Cracking hydrocarbons at high rates of heat input while avoiding excessive coke formation, by reason of low temperature differential between hydrocarbon and heating medium. No. 2,406,640. Paul Siecke to Gulf Oil Corp.

Thermally, non-catalytically reacting olefinic hydrocarbon with polynuclear aromatic compound containing conjugated diene structure. The compound 9,10-cyclohexano-9,10-dihydroanthracene. No. 2,406,645. Charles Thomas to Universal Oil Products Co.

Manufacturing stable plastic grease comprises forming slurry of metal soaps including lithium soap and lubricating oil stock, introducing slurry into long heating coil of small diameter, etc. No. 2,406,655. Alfred Bax, Harry Kielhorn and William Forney to Cities Service Oil Co.

Aviation fuel blend for use in supercharged engines comprising high anti-knock rating base fuel containing isoparaffinic hydrocarbons and anti-knock additive, and blending fuel comprising 2,3-dimethylbutane. No. 2,406,667. Louis Clarke to The Texas Co.

Isomerizing normal butane comprising passing stream of normal butane in liquid phase through primary reaction zone, subjecting butane to contact with catalyst consisting of aluminum chloride-hydrocarbon complex and aluminum chloride, etc. No. 2,406,681. Nelson Haskell to The Texas Co.

Manufacturing 2,3-dimethylbutenes, includes passing vapors of neohexane over catalyst comprising chromium oxide. No. 2,406,688. Aaron Horton and John Kellett, III, to Socony-Vacuum Oil Co., Inc.

Treatment of narrow boiling range complex hydrocarbon fraction to separate one component from other components which ordinarily distill from hydrocarbon fraction in same temperature range, comprises fractionally distilling complex hydrocarbon fraction in presence of aliphatic ketone having boiling point within 100° F. below and 40° F. above average boiling point of complex hydrocarbon fraction, etc. No. 2,406,695. George Lake to Union Oil Co. of California.

Isobutane alkylated by ethylene in reaction zone containing aluminum chloride alkylation catalyst. No. 2,406,709. Ernest Pevere to The Texas Co.

Isomerizing saturated hydrocarbons by action of Friedel-Crafts metallic halide isomerization catalyst in presence of hydrogen halide, metallic halide being partially soluble in hydrocarbons. No. 2,406,721. Preston Veltman to The Texas Co.

Desalting reduced crude comprises maintaining propane in storage at elevated pressure and at elevated temperature mixing propane with a salt-bearing reduced crude, etc. No. 2,406,748. Norman Dickinson to Standard Oil Co.

In alkylating paraffinic hydrocarbon with olefinic hydrocarbon, improvement comprises contacting paraffinic hydrocarbon and olefinic hydrocarbon with alkylation catalyst consisting of organic nitro compound. No. 2,406,776. James Kirkpatrick, John Somers and Alexander Sachanen to Socony-Vacuum Oil Co., Inc.

Slurrying aluminum chloride for hydrocarbon conversion. No. 2,406,778. Willard Kruse, Cecil Nysewander and John Bolt to Standard Oil Co.

Distilling volatile hydrocarbons from hydrocarbonaceous solids comprises passing solid material in subdivided state through externally unheated distilling retort, effecting evolution of volatiles and leaving combustible heavy residue, etc. No. 2,406,810. Roland Day to Universal Oil Products Co.

Producing asphalt emulsifiable in hot, dilute aqueous caustic soda solution from asphalt not so emulsifiable, comprises adjusting petroleum acid content of asphalt. No. 2,406,823. **Joseph Fratis and Eugene** Oakley to American Bitumuls Co.

Improved production of hydrocarbons boiling within motor fuel boiling range comprises passing synthesis gas stream containing oxides of carbon and hydrogen and containing powdered catalyst upwardly through reaction zone, etc. No. 2,406,851. Aaron Redcay to Standard Catalytic Co.

In synthesis of hydrocarbons by reaction of carbon monoxide and hydrogen in presence of hydrogenating catalyst consisting of thoria and one of metals of group VIII of periodic system, increasing anti-knock value by associating with catalyst isomerizing and cracking catalyst of silica and oxide, alumina or zirconia. No. 2,406,864. Charles Thomas to Universal Oil Products Co.

Contacting normal paraffin containing at least 4 carbon atoms in presence of aluminum halide under isomerization reaction conditions, in presence of halogen-containing promoter and a naphthene. No. 2,406,868. Carl

Tongberg and Homer Hall to Standard Oil Development Co.

Preparing catalyst comprises dissolving normally solid anhydrous metal halide of Friedel-Crafts type in liquid anhydrous hydrogen halide, and volatilizing hydrogen halide from resulting solution. No. 2,406,869. John Upham to Phillips Petroleum Co.

Converting alkylation sludge containing sulphuric acid and sulphur compounds to sulphur dioxide in combustion chamber having extensive internal surface and brick checkerwork at one end through which gases issuing from chamber must pass, checkerwork brick carrying catalytic material promoting combustion of carbon and hydrogen with oxygen. No. 2,406,890. Albert Mohr to Chemical Construction Corp.

Alkylation comprises reacting isoparaffin with olefin in presence of liquid hydrogen fluoride catalyst having dissolved fluoride or oxyfluoride of sulfur, selenium, nitrogen, phosphorus, molybdenum, titanium, tungsten, vanadium or silicon. No. 2,406,954. Carl Linn to Universal Oil Products Co.

Isomerization process comprises contacting normally liquid paraffin hydrocarbon with isomerizing catalyst comprising free metal halide of Friedel-Crafts type under isomerizing conditions in presence of aromatic hydrocarbon containing one polynuclear aromatic group of fused ring type. No. 2,406,967. Herman Pines to Universal Oil Products Co.

Lubricant comprising non-lubricating organic liquid and organic silicon compound selected from hydrolysis products of organic silicanes and polymers of hydrolysis products. No. 2,406,971. Frank Sowa.

Alkylating paraffinic hydrocarbon with olefinic hydrocarbon, comprises contacting paraffinic hydrocarbon with olefinic hydrocarbon, in gaseous phase in presence of organic cyclic oxygen compound. No. 2,407,033. Arlie O'Kelly, Julius Plucker, III, and Robert Work to Socony Vacuum Oil Co., Inc.

Production of base stocks suitable for production of gasolines having high supercharged ratings comprises catalytically cracking hydrocarbon oil boiling above gasoline boiling range with clay-type cracking catalyst, etc. No. 2,407,052. William Bailey, Jr., and Bernard Greensfelder to Shell Development Co.

Composition comprising as base a hydrocarbon product containing hydrocarbon wax and auto-condensation product of aliphatic ketone. No. 2,407,087. Eugene Lieber and Aloysius Cashman to Standard Oil Development Co.

Continuously alkylating hydrocarbon having replaceable hydrogen atom with alkylating agent in presence of alkylation catalyst of greater specific gravity than hydrocarbon and alkylating agent. No. 2,407,136. Louis Clarke to The Texas Co.

Alkylation of paraffin with olefin in presence of activated aluminum halide-hydrocarbon complex catalyst, improvement comprises maintaining liquid body of activated aluminum halide-hydrocarbon complex catalyst of substantial height as continuous phase, introducing mixed feed of paraffin and olefin unmixed with catalyst with paraffin in liquid phase, etc. No. 2,407,137. Louis Clarke to The Texas Co.

Removing clay-suspended petroleum from oil-field water, comprises: passing water through bed composed of granules of ferrous sulfide. No. 2,407,180. Harold Schiller and Abraham Shapiro to Socony-Vacuum Oil Co., Inc.

Continuously alkylating ethylene with isoparaffin, improvement comprises forcing isoparaffin and ethylene through catalyst charging zone containing aluminum chloride which can be recharged, etc. No. 2,407,311. Charles Lynch and Howard Codet to Standard Oil Development Co.

Conversion of hydrocarbon oils comprises contacting oil in vapor form with finely-divided contact material. No. 2,407,371. Charles Jahnig to Standard Oil Development Co.

Dehydrogenating butene to form butadiene comprises contacting butene admixed with steam with copper oxide, and chromium oxide, iron oxide or manganese oxide, and compound of potassium. No. 2,407,373. Kenneth Kearby to Standard Oil Development Co.

Catalytic cracking process. No. 2,407,374. Conrad Kollenberg to Standard Oil Development Co.

Improvements in separation and concentration of secondary olefin from hydrocarbon mixture comprises contacting hydrocarbon mixture with sulfuric acid. No. 2,407,386. Harold Scheeline to Standard Oil Development Co.

Alkylating propylene with isobutane comprises contacting propylene with excess of isobutane in presence of liquid aluminum chloride-hydrocarbon complex. No. 2,407,390. Charles Watkins to Standard Oil Development Co.

Preparation of bituminous compositions of improved load-bearing capacities. No. 2,407,470. John Blott and Peter Alexander to Shell Development Co.

Continuous isomerization process in which normal paraffin with hydrogen halide are contacted with catalyst comprising porous support carrying aluminum halide. No. 2,407,488. William Franklin to Standard Oil Development Co.

Production of gasoline. No. 2,407,492. Larry Hall and Herman Boucher to Shell Development Co.

Low-temperature process of polymerizing isoolefinic material. No. 2,407,494. Harman Hartvigsen to Jasco, Inc.

Improvement in reacting paraffinic hydrocarbon with olefinic hydrocarbon, under alkylating conditions, in presence of carbon dioxide. No. 2,407,584. William Stover to Socony-Vacuum Oil Co., Inc.

Alkylating paraffinic hydrocarbons with olefinic hydrocarbons, in presence of mixture of carbon dioxide and water, so that alkylation is principal reaction. No. 2,407,585. William Stover to Socony-Vacuum Oil Co., Inc.

Photographic

Processing photographic films in long lengths comprising treatment chamber, means for traversing film in extended form through treatment chamber, comprising endless carrier arranged to be traversed in succession in oppositely directed helical paths, tensioning device coupled to endless carrier, coupled at other end to film. No. 2,405,645. Robert John Duguid.

In time scale sensitometer, apertured member for permitting passage of light to sensitized layer, aperture having one side stepped in logarithmically increasing progression, and detachable mask having continuously and logarithmically curved edge aligning with points of aperture steps, etc. No. 2,406,702. Herbert Morreall, Jr. to General Aniline & Film Corp.

Composition for preparation of photographic film base consisting of nitrocellulose and stabilizing amount of hydroxy aromatic compound. No. 2,407,209. Donald Swan and John Calhoun to Eastman Kodak Co.

Producing yellow photographic image in gelatino-silver halide emulsion layer, comprises exposing layer and developing it with primary aromatic amino developing agent in presence of o-alkoxy-benzoyl-acetanilide coupler compound. No. 2,407,210. Arnold Weissberger, Charles Kibler and Paul Vittum to Eastman Kodak Co.

Production of photolithographic printing plate. No. 2,407,290. John Pursell.

Photographic developer, containing developing agent and sodium anhydroformaldehyde sulfanilate and sodium sulfite. No. 2,407,600. Frederic Bean to Eastman Kodak Co.

Polymers

Manufacture of hollow articles by blowing and molding from masses of plastic glass delivered on perforated, movable, tilting work-tables, actuating means for tables knife in fixed position on inclined plane, fixed means near knife to bring by rocking tables in plane of knife. No. 2,405,557. Emile Bonnefoy-Cudraz.

Preparing hard stable resin of color below 5 Amber comprises bringing beta-pinene terpene fraction containing beta-pinene into reactive contact with fluoride of boron as polymerization catalyst to form resin polymer of beta-pinene. No. 2,405,558. Joseph Borglin to Hercules Powder Co.

Making composite material moldable under heat and pressure comprises treating particulate fibrous organic filler of wood particles with blood to provide all particles with coating, drying particles, superposing on coated particles coating of water-soluble phenolic-formaldehyde hesin, drying coated particles. No. 2,405,658. Henry Kremer.

Process for concentrating polychloroprene-in-aqueous medium dispersion wherein polychloroprene particles are negatively charged. No. 2,405,724. Frank Wilder to E. I. du Pont de Nemours & Co.

Composition comprising hard product of polymerization of mixture comprising isolated, fusible partial polymer of divinyl benzene and styrene. No. 2,405,817. Gaetano D'Alelio to General Electric Co.

Composition comprising normally solid polymer of ethylene and mixture of polymer, of naturally occurring fatty acid glyceride and ester of carboxylic acid with alcohol. No. 2,405,933. Witty Alderson, Jr. to E. I. du Pont de Nemours & Co.

Manufacturing batch of molding material having lustrous metallic appearance consists in grinding cellulose acetate as base, crushing base to flaky or flourlike consistency, adding lard as binding material, crushing metallic element into flake-like consistency, metallizing base material by mixing with metallic element in proportions of two parts of former to one part of latter. No. 2,405,953. Thomas Hillery to George Benda, Inc.

Polymerization of normally gaseous monoolefin, step comprises carrying on polymerization at temperature of from 20 to 400° C. under pressure between 150 and 3000 atmospheres in presence of 0.001 to 5.0% by weight of hydrazines or hydrazinium compounds. No. 2,405,950. William Hanford to E. I. du Pont de Nemours & Co.

Producing high tensile strength solid polymers of ethylene comprises continuously passing ethylene into tubular pressure-resistant vessel at pressure of 500 to 1500 atmospheres, temperature of 150 to 250° C. in absence of dispersing medium, in presence of from 1 to 6 parts water and 0. to 0.5 part, of benzene or chlorobenzene. No. 2,405,962. Alfred Larson and Norman Krase to E. I. du Pont de Nemours & Co.

Making aqueous emulsion of synthetic linear polycarbonamide which, when applied as coating and dried, yields thin continuous films, comprising dissolving polycarbonamide in water-insoluble organic solvent 50% of solvent consisting of alcohol boiling above 100° C., mixing solution with water and surface active agent, etc. No. 2,405,965. Robert Leekley to E. I. du Pont de Nemours & Co.

Chlorinating polymer from ethylene comprises reacting polymer in solution in carbon tetrachloride with sulfuryl chloride in presence of benzoyl peroxide at temperature between 50 and 130° C. No. 2,405,971. Ambrose McAlevy to E. I. du Pont de Nemours & Co.

Preparing transparent films from normally solid polymer of ethylene which melts at 100° C. to 120° C., comprising casting film on support from liquid composition, comprising modifying agent and solution of polymer, etc. No. 2,405,977. Franklin Peters to E. I. du Pont de Nemours & Co.

Fabricating polytetrafluoroethylene tape comprises pressing finely divided polytetrafluoroethylene powder into preform, baking until preform is sintered, cooling, shaving tape from preform, heating tape and quenching. No. 2,406,127. Johannes Alfthan to E. I. du Pont de Nemours & Co.

Manufacture of elastic composition suitable for electrical cable insulation comprises subjecting polystyrene to masticating mixing action of two adjacent parallel mixing rolls, polystyrene is rendered plastic and capable of assimilating polyisobutylene. No. 2,406,191. Hugh Cameron to Edgar Seifert.

Producing stable aqueous solution of urea-formaldehyde condensation product comprises heat reacting aqueous formaldehyde with mixture containing urea and monotertiary-alkyl-urea. No. 2,406,217. Mortimer Harvey and Solomon Caplan to Harvel Research Corp.

Preparation of cold-flow resistant rubber-like organic polysulphide polymers. No. 2,406,260. Laurence Ryden to The Dow Chemical Co.

Electrical conductor insulated with dielectric composition comprising polymer of dihalogenated styrene. No. 2,406,319. Lester Brooks and Mathew Nazzewski to Sprague Electric Co.

Production of resinous product by condensation, in presence of acid condensing agent, of formaldehyde and phenols or cyclohexanol, in presence of hydrogen fluoride whereby reaction time is decreased without darkening of product. No. 2,406,339. Darwin Badertscher and Henry Berger and Richard Bishop to Socony-Vacuum Oil Co., Inc.

Mold for forming optical elements of synthetic plastics. No. 2,406,361. Murry Fairbank and Dexter Cooper, Jr. to Polaroid Corp.

Making abrasive article comprises improving workability of unvulcanized butadiene polymer by treating with halogen-bearing plasticizing agent in which halide is chlorine, bromide or iodine and which is non-reactive with polymer but capable of softening polymer, etc. No. 2,406,385. Samuel Kistler to Norton Co.

Mold for use in formation of prism of polymerized synthetic plastic material. No. 2,406,401. John Richardson to Polaroid Corp.

Apparatus comprising, in combination. deformable fluid-tight container to be partially filled with mass of polymerizable plastic material, means sealing back ends of container, plurality of reciprocating elements adapted to alternately engage and compress different portions of container to induce reciprocating circulation of mass. No. 2,406,403. Howard Rogers to Polaroid Corp.

Plastic composition comprising homogeneous aggregate of litharge, finely divided metallic articles, and glycerin. No. 2,406,428. Christopher Luckhaupt to Augustus Southworth.

Utilizing scrap polymeric methyl methacrylate resin including cellulosic matter comprising treating in solution of sodium sulphide, next in solution of sodium bisulphite, washing, dissolving scrap and treated cellulosic matter in benzene and monohydric alcohol of saturated aliphatic series. No. 2,406,558. Henry Neumann, one-third to Leon Arpin, and one-third to Edward Symonds.

Mold comprising bottom wall with surrounding upwardly extending side walls forming mold cavity, plurality of cores extending upwardly from bottom wall part way to top of cavity, removable cover insertible in upper end of mold cavity, etc. No. 2,406,589. Marion Cunningham to Mishawaka Rubber & Woolen Manufacturing Co.

Coating cellulose acetate plastics plasticized with plasticizers having high affinity for nitrocellulose, cellulose acetate, and cellulose ethers to produce film. No. 2,406,658. Charles Bogin to Commercial Solvents Corp.

Making polymeric methyl isopropenyl ketone comprises heating in presence of hydrogen peroxide, single-phase water solution of methyl isopropenyl ketone. No. 2,406,684. Josef Heyd to Monsanto Chemical Co.

Heat treating thermo-setting plastic comprises subjecting different parts of plastic to alternating electrical stresses of diverse values, stresses to one part sufficient to produce polymerization, stresses to another part insufficient to produce polymerization. No. 2,406,714. Harold Strickland, Jr. to The Budd Co.

Co-polymer of vinyl fluoride and vinyl ester of lower saturated fatty acid. No. 2,406,717. Charles Thomas to Monsanto Chemical Co.

Mold for optical element of polymerized synthetic plastic material. No. 2,406,742. Dexter Cooper, Jr. to Polaroid Corp.

Molding materials under heat and pressure. No. 2,406,843. Harold Luth, Herman Scheidemantel and Sydney Krupnick to The Brunswick-Balke-Collender Co.

Composition comprising polymerized 2-chloro-butadiene 1,3, and of preformed, vulcanized, thermoplastic, sticky, oil-resin mix. No. 2,407,038. Paul Stamberger.

Stabilized resin composition containing stabilizing amount of mononuclear aryl hydroxy benzoate and resin resulting from polymerization of methyl isopropenyl ketone. No. 2,407,051. David Adelson and Hans Dannenberg to Shell Development Co.

Manufacturing shaped articles, comprises reacting monomeric acetal of mono-aldehyde with solid polyvinyl base material. No. 2,407,061. Joseph Dahle to Pro-phy-lac-tic Brush Co.

Stable aqueous dispersion of polymerized alkyl alkacrylate containing dispersed alkacrylate. No. 2,407,107. Joseph Smith to E. I. du Pont de Nemours & Co.

Plastic having monomeric form the formula described in patent. No. 2,407,131. Herman Bruson and George Butler to Rohm & Haas Co.

Sulphonamide derivatives of melamine and processes for production. No. 2,407,177. Richard Roblin, Jr. and Philip Winnek to American Cyanamid Co.

Preparation of greasy to waxy, silicon-containing, polymeric materials comprises reacting ethylene with silicon halide. No. 2,407,181. Samuel Scott to E. I. du Pont de Nemours & Co.

Molding powder to be formed into articles by heat and pressure comprising mixture of wheat flour, extracted pine wood pitch, and synthetic resin. No. 2,407,225. Cletus Dixon to The Protectoseal Co.

Stabilizing polymerized rosin or polymerized rosin esters comprises contacting material with sulfur. No. 2,407,248. Joseph Borglin to Hercules Powder Co.

Mold for formation of optical prism of polymerized synthetic plastic material. No. 2,407,280. Mark Hyman, Jr. to Polaroid Corp.

Apparatus for heating pairs of strips of organic resin insulation by dielectric loss as they enter nip of pair of cooperating electrically conducting rolls, etc. No. 2,407,354. George Walton, Joshua Quayle and Peter Jones to British Insulated Cables, Ltd.

Colloidal aqueous solution of partially polymerized, negatively charged resinous compound of formula described in patent. No. 2,407,376. Charles Maxwell to American Cyanamid Co.

Forming plasticized bodies of styrene-maleic anhydride resin, comprises admixing styrene, maleic acid and methyl levulinate and subjecting to polymerization. No. 2,407,413. Howard Gerhart to Pittsburgh Plate Glass Co.

In liquid container which includes envelope of flexible non-metallic material, plurality of supporting members inserted between and secured to oppositely portions of envelope. No. 2,407,455. Leonard Shakesby and Sydney Smith to Imperial Chemical Industries, Ltd.

Composition comprising product of polymerization of mixture including polymerizable unsaturated alkyd resin and polymerizable monohydric alcohol polyester of alpha unsaturated alpha beta polycarboxylic acid. No. 2,407,479. Gaetano D'Alelio to General Electric Co.

Machine for plasticizing and extruding thermoplastic materials. No. 2,407,503. Wilhelm Magerkurth and Hans Buecken to National Rubber Machinery Co.

Preparing thermosetting resinous products containing sulfonate groups. No. 2,407,599. Robert Auten and James Rainey to The Resinous Products & Chemical Co.

Processes and Methods

Coating metal sheet with vaporized metal comprising introducing metal, prior to coating into feeding zone, maintaining under reduced pressure, advancing metal sheet from feeding zone in horizontal plane, maintaining metal sheet under reduced pressure, into coating zone, etc. No. 2,405,662. Charles McManus, John Elder, Giles Cooke and Albert Dornblatt to Crown Cork & Seal Co., Inc.

Reducing volatile content of slurry coal, consists in depositing layer of slurry coal upon moving conveyor, through heated oven containing only air and volatile and gases from coal, withdrawing air, volatile and gases, forming layer of coal into solid bodies or briquettes. No. 2,406,077. Andrew Howe to Centrifugal & Mechanical Industries, Inc.

Producing in chamber rapid transitions between selected temperatures, means for heating chamber, first means for cooling chamber including refrigeration system, second cooling system for delivering cooling liquid for heat exchange with chamber independently of first cooling means, second cooling system including discharge means for freeing cooling system of cooling liquid when heating means or first cooling means in operation for establishing respectively high or low temperatures. No. 2,406,080. James Laird.

In air conditioning method of removing dust comprises contacting dust-laden air with water-soluble, non-volatile liquid consisting of ammonium salt of acid ester of polybasic inorganic oxyacid and polyhydroxy aliphatic compound, and water. No. 2,407,255. Martin Cupery to E. I. du Pont de Nemours & Co.

Apparatus for dynamically testing hardness of material, ballistic pendulum for supporting specimen plate, indenter, means for propelling indenter into contact with specimen plate, optical means for indicating resulting deflection. No. 2,407,278. Arthur Hodges.

In mixture of liquids having high cohesive force to support large power transmission and high vapor pressure to reduce destructive effect of cavitation, the combination of dimethyl phthalate and xylene hexafluoride. No. 2,407,315. Warren Mason to Bell Telephone Laboratories, Inc.

Treating fluid masses by supersonic waves includes supporting mass in thin walled suspended soft rubber container in exterior contact with supersonic wave transmitting liquid. No. 2,407,462. Edward Whiteley.

Rubber

Apparatus for reclaiming and regenerating waste rubber. No. 2,406,297. Alexander Johnston to The North British Rubber Co., Ltd.

Vulcanizing unit. No. 2,406,455. Cyril Davidson.

Removing rubber from metal in structure in which rubber is adhered to metal comprises subjecting structure to action of ammonia, monomethylamine, dimethylamine or monoethylamine. No. 2,406,458. Paul Gerndt and John Hannum to United States Rubber Co.

Inhibiting deterioration of rubber comprises incorporating in rubber secondary aromatic amine antioxidant and carbon, hydrogen or nitrogen or metal complexes of phthalocyanines in which metals are copper, silver, tin, cobalt, nickel, magnesium, zinc or aluminum. No. 2,406,722. John Vincent to E. I. du Pont de Nemours & Co.

Preparing non-staining reclaimed rubber comprises refluxing solid, alkali reclaimed rubber with solvent mixture containing carbon tetrachloride, and methyl alcohol. No. 2,407,193. Harry Thompson to Wingfoot Corp.

Making resilient bushing in which body of rubber-like material is molded within outer sleeve member. No. 2,407,559. Alvin Krotz to The B. F. Goodrich Co.

Specialties

Core composition consisting predominantly of sand, containing partially polymerized urea-formaldehyde resin mixed with calcium magnesium ligno-sulfonate to reduce stickiness of core, and on baking to render it resistant to moisture. No. 2,405,650. Carl Hartwig and Raymond Roehrenbeck to Swan-Finch Oil Corp.

Preparing oxidation and rust inhibitor for mineral turbine oils comprising recovering from used aqueous caustic alkali solution by neutralization with acidic substance the "acid oil" free from constituents soluble in aqueous solution of pH 8, extracting "acid oil" with hydrocarbon solvent. No. 2,405,906. Hans Schindler and Lawrence Henderson to The Pure Oil Co.

Solvent spreadable, internally strong pressure-sensitive adhesive composition comprising condensation product of castor oil with maleic half ester of monohydric alcohol and minor portion of compatible cohesive agent. No. 2,405,926. Rudolf Priepke, John Emigh and Charles Pike to Industrial Tape Corp.

Plywood adhesively bonded by adhesive comprising carboxylic acid catalyst and condensation product of formaldehyde with hydrolyzed ethylene-vinyl acetate interpolymer. No. 2,405,983. William Sharkey, Henry Cadot and William Clark to E. I. du Pont de Nemours & Co.

Self-sealing fuel container, walls comprise flexible sheet material comprising plurality of adherent laminae comprising outer layer of raw rubber adapted to swell on contact with hydrocarbon liquid, layer which mechanically expands to close openings caused by perforations which comprises plasticized neoprene, a layer of neoprene which is harder than last mentioned layer, layer of polyamide. No. 2,405,986. David Sullivan to E. I. du Pont de Nemours & Co.

Dental cement liquid comprising liquid solution includes eugenol and relatively low percentage of acetic acid. No. 2,406,063, Walter Crowell to The S. S. White Dental Manufacturing Co.

Plating bath for electrodeposition of metal comprising aqueous solution providing ions of metal to be deposited and metal starchate addition agent comprising reaction product of starch and alkali metal. No. 2,406,072. Kenneth Gaver to The Ohio State University Research Foundation.

Electroplating tin comprises electrolyzing aqueous solution of alkali metal stannate and alkali metal hydroxide with alloy anode comprising tin and one alkali metal. No. 2,406,189. Newell Blackburn to E. I. du Pont de Nemours & Co.

Composition to be dispersed in aqueous acid solution to form metal-pickling bath, comprising liquid thiazolinyl sulfide dispersed on finely divided solid soluble in dilute aqueous acid bath. No. 2,406,379. Aaron Johnson to E. I. du Pont de Nemours & Co.

Oleaginous composition capable of forming oil-in-water emulsions, contains foam-reducing amount of associated compound selected from group of formulae described in patent. No. 2,406,671. Hyman Diamond to Shell Development Co.

Lithographic printing ink which shows considerably reduced greasing, comprising pigment dispersed in vehicle, essential basis of which is ester of pentaerythritol and tall oil. No. 2,406,795. Dominic Bernardi and Robert Florence to Interchemical Corp.

Printing ink comprising pigment dispersed in vehicle capable of being dried by ultra violet energy, containing binder having conjugated system of double bonds, containing dicinnamal acetone. No. 2,406,878. Paul Whyzmuzis and Harry Linkletter to Interchemical Corp.

Preparing for immediate shipment anti-corrosion plug containing dehydrating material. No. 2,406.993. Milton Chandler to Chandler-Evans Corp.

Making salt water soap, heating mixture of naphthalene and lauryl alcohol, cooling slurry, adding fuming sulphuric acid, mixing resulting liquid with aqueous alkali metal hydroxide solution, mixing mass with anhydrous soap and water. No. 2,407,130. James Blades to Kamen Soap Products Co.

Stable adhesive comprising phosphorus oxychloride treated natural rubber dissolved in monomeric styrene and ethylamine as stabilizer. No. 2,407,143. Theodor Daur and Walter Daniel.

Additional patents on all other classifications from the above volumes will be given next month.

Abstracts of Canadian Patents

Collected from Original Sources and Edited

Requests for further information or photostated copies of the patents reported below should be addressed to the Commissioner of Patents and Copyrights, Department Secretary of State, Ottawa, Canada

CANADIAN PATENTS

Granted and Published October 8, 1946

Concentrating magnesia by adding iron oxide to a crude magnesian material, heating to the formation of a fusible ferrite and separating the fused portion from the un-melted magnesia. No. 437,315. Canadian Refractories Ltd. (Basic Refractories Inc. and Harley C. Lee).

Flux-forming fuel comprising fuel comprising a comminuted unbonded composition containing by weight, about 6 per cent zirconium, about 8 per cent silicon the remainder being substantially all iron. No. 437,323. Dominion Oxygen Company Ltd. (Robert B. Aitchison).

Phosphate recovery from phosphate boiler sludge. No. 437,331. Hall Laboratories, Inc. (Edward W. Butzler).

Producing ceramics by heating the bauxite to 500°C.-1000°C. until it is dehydrated, wet grinding to a fineness of less than 50 microns and ranging primarily between 5 and 20 microns, forming and firing. No. 437,333. Heany Industrial Ceramic Corp. (John Allen Heany).

Method of coating surfaces with quartz by evaporation technique within a vacuum. No. 437,335. Libby-Owens-Ford Glass Co. (Willard L. Morgan).

Pressure-sensitive adhesive tape obtained by heating together pasty tacky rubber and sufficient oil-soluble heat-reactive phenol-aldehyde resin to render non-thermopolastic and more cohesive than adhesive but still tacky. No. 437,338. Minnesota Mining & Mfg. Co. (Clarence J. Ebel).

Vaporizing metal by helically channelling the surface of a refractory core, introducing the metal to be vaporized into the channel so formed and electrically heating the core. No. 437,342. Philips Lamps Ltd. (Adriaan Jacobus Van Hoorn and Gerard Thurmer).

Aqueous acidic solution for producing an adherent corrosion resistant coating on zinc and cadmium consisting of a water soluble chromate and an organic compound which is easily oxidized by chromic acid. No. 437,347. Rheem Research Products, Inc. (Robert M. Thomas and Charles W. Ostrander).

Producing an adherent corrosion resistant coating on zinc and cadmium by subjecting to the aqueous acidic solution essentially consisting of sodium dichromate, formic acid and zinc nitrate. No. 437,349. Rheem Research Products Inc. (Vernon J. King).

Aliphatic unsaturated mono-mercaptan of twelve to eighteen carbon atoms per molecule having a straight open chain of at least seven carbon atoms and the -SH group directly linked to an olefinic carbon atom. No. 437,353. Shell Development Co. (Martin De Simo and John J. O'Connor).

A secondary alkyl monothiol containing less than 17 carbon atoms per molecule and at least 10 carbon atoms in a straight chain. No. 437,354. Shell Development Company. (Martin De Simo and John J. O'Connor).

Production of coloured cellulose acetate fibres by spinning into fibres a solution of cellulose acetate in an organic liquid coloured with a dye. No. 437,383. Claude George Bonard. (Henry Charles Olpin, Edmund Stanley and Christopher S. Argyle).

Diazo dye obtainable by coupling a diazotized amino-azo-benzene with 3-stearoyl-amino-N-diethyl-aniline. No. 437,384. Claude George Bonard. (Henry Charles Olpin, Edmund Stanley and Christopher S. Argyle).

Granted and Published October 15, 1946

Conduit plastic lining apparatus. No. 437,397. Hubert Russell Crane.

Method of treating a metal-containing material to derive a water-soluble iodine-containing compound. No. 437,403. George D. Harrison.

Process of producing shaped articles from finely comminuting bituminous coal. No. 437,418. C. D. Patents Limited. (Donald Hugh Bangham, George Cordery Phillpotts, John Godolphin Bennett, Wallace Hirst, Robert Leslie Brown, Marcello Pirani).

Phosphor consisting of a strontium aluminate matrix activated with a minor proportion of manganese, characterized by red fluorescence under longwave ultraviolet excitation, and by orange fluorescence under cathode rays. No. 437,424. Canadian General Electric Company Ltd. (Herman C. Froelich).

Continuous process for the production of alginic acid films. No. 437,426. Cofoil Ltd. (Robert Charles Rose).

Powdered fire-extinguishing composition containing lycopodium, a substance evolving carbon-dioxide gas upon subjection to fire and a non-delequescent bulking material. No. 437,438. Halco Chemical Corp. (Elden W. Hanks).

Homogeneous zinc resinate of a hydrogenated rosin. No. 437,439. Hercules Powder Company. (Herschel Adams Elliott).

Homogeneous fused lead resinate of a hydrogenated rosin having a lead content greater than the equivalent combining proportion of the hydrogenated rosin but not in excess of about 40 per cent by weight. No. 437,440. Hercules Powder Company. (Herschel Adams Elliott).

Lead resinate of a heat-treated rosin having a lead content from 26 per cent to 40 per cent obtained by heating a natural rosin to a temperature in the range of 250°C-350°C until the specific optical rotation has reached the range of +20° to +60°. No. 437,441. Hercules Powder Company. (Herschel Adams Elliott).

Method of producing a cobalt resinate of a heat-treated rosin having a cobalt content not in excess of about 19 per cent by weight. No. 437,442. Hercules Powder Company. (Paul Ray Mosher).

Cobalt resinate of a hydrogenated rosin saturated to the extent of at least 50 per cent of both double bonds of the rosin acid contained therein. No. 437,443. Hercules Powder Company. (Herschel Adams Elliott).

Fused heavy metal resinate of hydrogenated rosin saturated by hydrogen to the extent of at least about 50 per cent of the theoretical for two double bonds of its original unsaturated rosin acid content. No. 437,444. Hercules Powder Company. (Emile Pragoff, Jr.).

Process for the production of shaped articles having a basis of a carboxylic acid ester of cellulose. No. 437,459. Camille Dreyfus. (Joseph E. Bludworth).

Production of azo dyes by coupling a tetrazotized 4·4′-diaminoazobenzene with the 2′5′-dimethoxy anilide of 3-hydroxy-2-carboxy-diphenylene oxide. No. 437,460. Claude George Bonard. (Henry Dreyfus, Henry Charles Olpin, Edmund Stanley).

Granted and Published October 22, 1946

Waxing brush employing liquid wax. No. 437,466. Roland Gaucher.

Material having a yellow fluorescence resulting from heating a mixture of oxides of zinc and vanadium to a temperature within the range of 600°C to 900°. No. 437,478. American Optical Company. (Woldemar A. Weyl).

Ketone-urea-formaldehyde condensation product. No. 437,483. Canadian Industries Ltd. (Walter Nebel).

Process for manufacturing wire coated with a normally solid polymer of ethylene. No. 437,484. Canadian Industries Limited. (Edmond George Williams).

Stable solution which comprises a petroleum oil having dissolved therein a copper mercaptide derived from alpha-pinene in an amount sufficient to provide a concentrated solution and a small proportion, sufficient to stabilize the solution, of naphthenic acids whose copper salts are soluble in the oil to the extent of at least 0.1 per cent. No. 437,485. Canadian Industries Limited. (Ernest Lloyd Korb, John Reginald Sabina).

Stabilized product comprising nitrourea and a solid compound taken from the group consisting of acids and acid salts. No. 437,486. Canadian Industries Limited. (Lawton Arthur Burrows, Walter Cornelius Holmes and Charles Philip Spaeth).

Normally solid hydroxyl group-containing polymers obtained by reacting formaldehyde with ethylene in the presence of a per-oxy compound catalyst. No. 437,487. Canadian Industries Limited. (William Edward Hanford).

Regenerated cellulose sheet containing a water soluble organic sulphoxidate. No. 437,488. Canadian Industries Limited. (William August Hoffman and Richard Seyfarth Schreiber).

Process of coating a water-soluble polyvinyl alcohol film or sheet with a solution of a water-insoluble polyvinyl acetal resin, an aliphatic aldehyde containing not more than 4 carbon atoms, and an acid catalyst in a volatile organic solvent. No. 437,489. Canadian Industries Limited. (Walter John Jebens).

As a new compound, an N-dibutyl thiocarbamyl sulfamine in which the amine group is represented by $-NH_2$. No. 437,496. Dominion Rubber Company, Ltd. (Roy Stanley Hanslick).

Process of colour photography which comprises developing a reducible silver salt image in the presence of a dye-intermediate. No. 437,498. E. I. du Pont de Nemours & Co. (David Willcox Woodward).

Process which comprises partially polymerizing a polymerizable vinyl compound, dispersing the resultant partial polymer in an aqueous medium containing an emulsifying agent, and then completing the polymerization of the dispersed partial polymer. No. 437,517. Chemische Ferschungsgesellschaft M.B.H. (Herbert Berg).

Granted and Published October 29, 1946

Inspecting coal to detect sulphur impurities by subjecting near ultraviolet light to produce a visible orange fluorescence. No. 437,527. Walter Turner Brown.

Alloy for flints consisting of 300 parts of misch-metal, 75 to 100 parts of iron, about 5 parts of copper, 2 to 4 parts of silver, 1 part nickel and 1 part chromium. No. 437,538. Henry Kent.

Making artificial marble articles by mixing different coloured slurries of a waterproof cement and a colouring dye and pouring into a mould. No. 437,548. Eugene Meuse.

Fuel and high temperature coke manufacturing apparatus. No. 437,559. Kindred L. Storrs.

Making powdered ferrous metal suitable for powder metallurgy by subdividing a carbon-containing ferrous metal in the liquid state, solidifying the subdivided metal, mechanically disintegrating and decarburizing. No. 437,561. Nils K. G. Tholand.

Process for recovering sulphur dioxide from a mixture of gases by absorbing sulphur dioxide with an organic-base absorbent, stripping the absorbent of sulphur dioxide by heating and recovering the liberated sulphur dioxide. No. 437,575. American Smelting & Refining Company. (Edward P. Fleming and T. Cleon Fitt).

Removing a suspension of positively charged colloidal impurities from glyceride oils by converting the oil to an aerosol, converting a neutralizing agent to an aerosol, and intimately mixing the two aerosols whereby the neutralizing agent reacts with the free fatty acids in the oil and forms a highly dispersed colloidal soap stock and separating the soap stock from the oil. No. 437,576. Anderson, Clayton & Co. (Anderson, Clayton & Co. of Houston, Ralph H. Fash).

Ceramic member having high physical properties comprising in combination a porcelain body and a smooth insulating coloured glaze applied to the surface. No. 437,598. Canadian Westinghouse Company, Ltd. (Ralston Russell, Jr.).

Method of preventing warping or bowing of extruded thermopolastic synthetic resin strips. No. 437,622. Extruded Plastics, Inc. (Charles E. Slaughter).

(To be continued)

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

422,887. Spalding Research Laboratories, Inc., Lansing, Mich.; filed Sept. 14, 1945; Serial No. 488,487; for cleaning solution having mothproofing properties; since July 15, 1944.

423,099. Magnus Chemical Co., Inc., Garwood, N. J.; filed Feb. 11, 1944; Serial No. 467,344; for lubricant, anhydrous granulated or powdered soap in wire drawing operations; since Mar. 15, 1943.

423,108. William H. Bone, as Crown Products Co., Douglas, Ga.; filed Oct. 12, 1944; Serial No. 475,240; for penetrating oils for lubricating; since Apr. 4, 1937.

423,877. Magnus Bjorndal, as Tech Laboratories, Jersey City, N. J.; filed Aug. 21, 1944; Serial No. 473,465; for potentiometers, viscosity meters, moisture meters; since June 1, 1944.

423,878. Magnus Bjorndal, as Tech Laboratories, Jersey City, N. J.; filed Aug. 22, 1944; Serial No. 473,496; for potentiometers, viscosity meters, moisture meters; since October 1933.

423,905. The B. F. Goodrich Co., New York, N. Y., and Akron, Ohio, as B. F. Goodrich Chemical Co., Cleveland, Ohio; filed Nov. 14, 1945; Serial No. 491,564; for organic chemical material as vulcanization accelerator; since Nov. 2, 1942.

459,805. Albert C. Fischer as Servicised Products Co., Chicago, Ill.; filed Apr. 12, 1943; for natural and synthetic plastic compositions; since May 1, 1915.

476,852. L. Sonneborn Sons, Inc., New York, N. Y.; filed Nov. 24, 1944; for hardening and waterproofing powdered composition; since Sept. 14, 1944.

480,313. Commercial Solvents Corp., New York, N. Y.; filed Feb. 28, 1945; for dihydric alcohol (methylpentanediol); since Jan. 3, 1945.

486,648. Better Finishes and Coatings, Inc., Newark, N. J.; filed Aug. 3, 1945; for resinous coating compositions; since Jan. 7, 1944.

487,534. The Visking Corp., Chicago, Ill.; filed Aug. 24, 1945; for monofilaments made from polymeric vinylidene chloride; since Feb. 12, 1945.

487,672. General Aniline & Film Corp., New York, N. Y.; filed Aug. 28, 1945; for chemicals and preparations used in photographic processes; since Aug. 9, 1945.

487,915. Puget Sound Pulp & Timber Co., Bellingham, Wash.; filed Sept. 1, 1945; for filler in plastics; since Aug. 10, 1943.

488,074. Agawam Chemicals, Inc., West Springfield, Mass.; filed Sept. 7, 1945; for rubber accelerators, antioxidants, resin tackifiers and solvents; since June 15, 1945.

488,439. American Cyanamid Co., New York, N. Y.; filed Sept. 14, 1945; for synthetic resins; since Aug. 18, 1945.

488,577. The De Pree Co., Holland, Mich.; filed Sept. 17, 1945; for insecticides; since Mar. 1, 1945.

488,971. Peerless Photo Products, Inc., New York, N. Y.; filed Sept. 25, 1945; for developing, fixing, and transferring bath chemicals; since May 8, 1942.

490,075. National Starch Products Inc., New York, N. Y.; filed Oct. 17, 1945; for resin and starch adhesives; since Sept. 27, 1945.

490,825. Ralph S. Harte, San Francisco, Calif.; filed Oct. 31, 1945; for thin transparent or translucent sheets of polyvinyl chloride resin; since Aug. 1, 1945.

490,829. Ralph S. Harte, San Francisco, Calif.; filed Oct. 31, 1945; for thin transparent or translucent sheets or films of polyvinyl chloride resin; since Aug. 1, 1945.

491,109. Monsanto Chemical Co., St. Louis, Mo.; filed Nov. 5, 1945; for synthetic resins in solid and solution forms; since Oct. 17, 1945.

491,391. Bee Chemical Co., Chicago, Ill.; filed Nov. 10, 1945; for grinding chemicals, additives and cutting chemicals; since September 1945.

491,991. Minnesota Mining & Manufacturing Co., St. Paul, Minn.; filed Nov. 21, 1945; for sheet material of plastic fibers laid in felted or meshed fashion; since September 1945.

491,996. Paint Engineers, Inc., New York, N. Y., and Hawthorne, N. J.; filed Nov. 21, 1945; for fungus inhibiting and impregnating chemicals; since Nov. 5, 1945.

492,342. The Sherwin-Williams Co., Cleveland, Ohio; filed Nov. 28, 1945; for insecticides and fungicides; since Aug. 13, 1945.

492,942. Multifax Enterprises, Ltd., Toronto, Ontario, Canada; filed Dec. 8, 1945; for detergent in powdered form; since April 1945.

493,659. Colgate-Palmolive-Peet Co., Jersey City, N. J., filed Dec. 21, 1945; for methyl ester of cocoanut oil fatty acids; since May 28, 1945.

494,371. Sun Oil Co., Philadelphia, Pa.; filed Jan. 5, 1946; for plasticizer for rubber; since Nov. 13, 1943.

494,574. William Peterman, Inc., Newark, N. J.; filed Jan. 10, 1946; for insecticide; since June 24, 1919.

494,921. Quaker Chemical Products Corp., Conshohocken, Pa.; filed Jan. 17, 1946; for emulsions of waxes; since Dec. 14, 1945.

495,113. United States Gypsum Co., Chicago, Ill.; filed Jan. 19, 1946; for plastic wall coverings; since Oct. 3, 1945.

495,570. California Spray-Chemical Corp., Wilmington, Del., and Richmond, Calif.; filed Jan. 29, 1946; for insecticides, fungicides, and germicides; since Dec. 18, 1945.

495,669. Hardesty Chemical Co. Inc., New York, N. Y.; filed Jan. 30, 1946; for aryl benzene; since Jan. 8, 1946.

495,818. Petroleum Solvents Corp., New York, N. Y.; filed Feb. 1, 1946; for chemical solvent and cleaner; since Feb. 1, 1934.

495,819. Petroleum Solvents Corp., New York, N. Y.; filed Feb. 1, 1946; for chemical solvent and cleaner; since Dec. 1, 1935.

496,696. General Chemical Co., New York, N. Y.; filed Feb. 16, 1946; for normally gaseous halogenated hydrocarbons; since Jan. 4, 1946.

496,855. National Rubber Machinery Co., Akron, Ohio; filed Feb. 18, 1946; for extrusion presses for plastics; since Sept. 28, 1942.

497,133. Theo. Ross, as Theo. Ross Associates, Los Angeles, Calif.; filed Feb. 23, 1946; for liquid compound as disinfectant, germicide, fungicide, and deodorant, having cleansing properties; since Feb. 4, 1946.

497,661. Justin M. Fry, as J. M. Fry Co., Richmond, Va.; filed Mar. 5, 1946; for antioxidation compound; since Nov. 2, 1945.

498,093. Swan-Finch Oil Corp., New York, N. Y.; filed Mar. 12, 1946; for core oils and core binders; since May 5, 1937.

498,330. Vapor Engineering Corp., Los Angeles, Calif.; filed Mar. 15, 1946; for degreasing solvent; since Dec. 29, 1945.

498,355. Monsanto Chemical Co., St. Louis, Mo.; filed Mar. 16, 1946; for insecticides and fungicides; since Feb. 11, 1946.

498,574. H. P. Andrews Paper Co., New York, N. Y.; filed Mar. 20, 1946; for chemicals in preparation of blueprint formulae; since Mar. 6, 1946.

499,141. McLaughlin Gormley King Co., Minneapolis, Minn.; filed Mar. 28, 1946; for insecticides; since Mar. 8, 1946.

499,600. American Chemical Paint Co., Ambler, Pa.; filed Apr. 4, 1946; for chemical preparations for exterminating weeds; since Aug. 10, 1931.

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Molecular Weight	100.51
Color	Colorless
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Boiling Point	—9.2° C
Density	1.194 at —10° C
Latent heat of vaporization	96 B.t.u./lb.

Vapor pressure (p.s.i. abs.):

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